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MYSORE EDUCATION MEMORANDUM.

BY THE EDITOR.

THE Government of Mysore have extended the time for sending in opinions on their Education Memorandum to the last day of December, 1919. This, we have no doubt, will give ample time to those who wish to study it in full and submit their views. We have already received a few opinions for publication and doubtless will receive more in the next few weeks. We hope to publish what we receive in a fairly connected form in the *Journal*. Those who have not yet sent their views will do well to dwell on matters essentially within their personal knowledge or experience. It is best to be brief so that all that is received may be easily put together and presented in an assimilable farm.

In expressing their views, correspondents would do well to concentrate attention on one or two essential points. How far are the reforms suggested in keeping with the past history of education in the State? That is one point. How far are the reforms suggested desirable in themselves as a means to an end? Are the reforms proposed such as to enable us to build anew on sounder and surer foundations? These are other questions for consideration. They should also weigh the proposals well and see how far they will, if adopted, enable us to fit our children and children's children to fight the future fully equipped. The world that is to be will not be the world that was dead with the War. The new world that is arising has need to take stock of not only what has already been achieved in the past but also to allow a great deal for the interplay of cause and effect. The War has wrought radical changes in many directions, not least, on the social fabric everywhere. Its lessons cannot be ignored in any sphere of life, least of all in that of education. As a recent writer remarks :—

"Of the social institutions educational systems have for the first time received attention commensurate with their importance, for education is among the strongest influences which make a man what he is, and in education more than in any other factor lies the hope of the world. Especially have the systems of England and Germany been compared. The two differ in almost every respect. German education is systematised, intelligible and admittedly efficient. English education is apparently chaotic yet also effective in its own way. Which is the better system? By what educational machinery has Germany installed in her people the blind faith in a cause that has aligned the world against her? By what system has England trained her young men for leadership? Similar queries arise when any of the belligerent countries is considered. How has France schooled her sons to such

courage and devotion as have astounded the world? How does the United States solve the question of democratic education? From comparisons such as these inevitably must follow the conclusion that an educational system is something more than a mere organization for importing knowledge to the rising generation. More adequately than any other phase of national life an educational system expresses the innermost beliefs, ideals, and aspirations of a people.

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Educational systems differ from each other by reason of a number of factors—historical, geographical, ethnological, political and economic. But more surely and fixedly than these the theory of the state and society held by a people determines the character of its educational institutions."

Critics would do well to ponder these words, if they desire to make a fruitful contribution to the discussion. The details of educational practice may change from time to time, but the basic principles on which education in any country rests change so slowly that it is of the utmost importance to approach it with becoming grace. Every country has developed according to its genius. Germany is an instance of centralization under absolute control; France is an example of centralization under popular control; England illustrates in her system the principles of individualism and initiative; the United States embodies the hopes of a democracy; Canada typifies a country building up an educational system under pioneering conditions of development; and Denmark stands for the conscious adaptation of an educational system to the needs of an agricultural community. How far can any of these systems be upheld for imitation? And what is the place of imitation in matters educational? Education, as the writer we have quoted above, well brings out, is too vital a part of the social organism to be transplanted or grafted. Much of great value may be gleaned from a study of foreign systems, but any wholesale adoption of any of them is not likely to make for progress in a country with social, political and economic antecedents of a character entirely different from those of the country it borrows from. Each country must try to evolve its own system, in keeping with its history and ideals.

TECHNICAL COURSES OF INSTRUCTION IN HIGH SCHOOLS.*

A very great change has come over the conception of Education which is now made to include Vocational training also as being as cultural as training in purely literary pursuits. Observation, collection and classification of data, reasoning upon them and applying the conclusions for the promotion of Industries, Commerce and healthy means of livelihood and national efficiency are considered to be no less cultural than a study of history and philosophy. They have the same humanistic value inasmuch as their object is service to society through self-help and the capacity for helpfulness.

In addition to their cultural value they have the directly utilitarian aim of promoting the Industrial and Commercial efficiency of a people which in these days of keen international competition must be regarded as an indispensable object of every educational system.

That a purely literary education has its defects some of which are of a serious character has been recognised by the experience not merely of India but of the west as well though the problem does not present itself in so acute a form there. In the report of the Royal Commission on Industrial Education appointed by the Government of Canada in 1910, occur the following passages which cannot be without interest to Indian educationists: "Educational work was becoming bookish in the extreme and worse than that was developed into a school system that had few points of contact with Industrial, Agricultural and Housekeeping life." "A new country needs the constructive and conquering qualities as well as sedentary, absorbing, remembering capacity." The Commission looked forward to a

*A note submitted to the Government of Mysore by the Inspector-General of Education in Mysore.

time "when arts will be acquired joyfully instead of painfully, reluctantly and with difficulty as separate school subjects." "Industrial training and Technical Education serve to supplement general education and give to it a finishing course of experiences with special reference to the requirements of the workers in industries, agriculture, housekeeping, commerce, transportation, mining and other occupations." The significance of which passage is that general education without industrial and technical training cannot be considered to be complete. It is only a partial education which has to be supplemented by other courses before the individual could be said to have received the full development that his nature is capable of. Further "in the opinion of the Commission it is important that from twelve years of age and onward the general and cultural education should *include* adequate vocational education." It is precisely this *inclusion* that the present Memorandum aims at achieving.

Of even more importance are the report and conclusions of the Committee of the N. E. A. of the United States published in 1910, which show how the old distinction between the general school and the technical school should be done away with and the two types synthesized into one complex whole. After defining the manual training High School as one in which a greater or less amount of handwork is taken up and in which the greater part of the academic instruction is like that found in other High Schools, and the technical High School as one in which the Technical side is emphasised while the general side is not absent either, the report of this Committee proceeds to show that technical High Schools however "usually form elective departments of High Schools; not many have been separately established. Moreover there are few either schools or departments to which the definition of Manual Training High School can be properly applied. Most have an outlook more or less industrial." In his interesting book on Education for Industrial purposes, Mr. Seath points out "At first Manual Training was advocated for the Grammar and High Schools on purely cultural grounds. During the last four or five years however as a result of the growing emphasis on the social side of education the conception of Manual Training in the Grammar Schools has come more and more to be that of an educative instrument interpreting the fields of art and industry in terms adapted to the life of the child and the limitations of the school" which shows that the country which did so much to promote Sloyd is now leaving Sloyd behind.

The following quotations from Mr. Seath's book will serve to illustrate the principle and practice that are advocated in this Memorandum. "Wisconsin has also provided for the establishment and maintenance of departments of Manual training (note Departments not separate schools) in High Schools and in the Upper grades of the Grammar Schools.

Perhaps the most decisive pronouncement on this subject is to be found in the report of the Massachusetts Commission on Industrial Education which has been described by Mr. Seath as "at present the most potent factor in the reorganization of Industrial training of the United States." Mr. Seath continues: "Its conclusions and recommendations are well worth the serious consideration of the people of Ontario; in my judgment they apply *mutatis mutandis* to Ontario as well." I might add to Mysore too with appropriate modifications. The following paragraphs reproduced *verbatim* will, it is hoped, be of decisive influence in this discussion.

"The Industries of Massachussets need, in addition to the general intelligence furnished by the public school system and the skill gained in the narrow fields of sub-divided labour, a broader training in the principles of

the trades and a finer culture in taste as applied to material, workmanship and design. Whatever may be the cost of such training the failure to furnish it would, in the end, be more costly.

"The State needs a wider diffusion of industrial intelligence as a foundation for the highest technical success, and this can be acquired only in connection with the general system of education, into which it should enter as an integral part from the beginning.

"The investigation has shown the increasing necessity for a woman to enter the industrial world for the sake of self-support, and hence that she should be prepared to earn a respectable living wage, and at the same time that the attempt should be to fit her so that she can and will enter those industries which are most closely allied to the home.

"The investigation has shown that the vocation in which all other women's vocations have their root, namely, the care of the home, has been overlooked in the modern system of education. In order that the industrial life of the community may be vigorous and progressive, the housekeepers need to be instructed in the laws of sanitation, in the purchase, preparation and care of food, and in the care of children, that the home may be a home and not merely a house."

RECOMMENDATIONS.

"That cities and towns so modify the work in the Elementary Schools as to include for boys and girls instruction and practice in the elements of productive industry, including agriculture, and the mechanic and domestic arts, and that this instruction be of such a character as to secure from it the highest cultural as well as the highest industrial value; and

"That the work in the High Schools be modified so that the instruction in mathematics, the sciences, and drawing shall show the application and use of these subjects in industrial life, with especial reference to local industries, so that the students may see that these subjects are not designated primarily and solely for academic purposes, but that they may be utilised for the purpose of practical life; that is, algebra and geometry should be so taught in the Public Schools as to show their relations to construction; botany to horticulture and agriculture; chemistry to agriculture, manufactures and domestic sciences; and drawing to every form of industry.

"The Commission also recommends:—

1. That all towns and cities provide by *new elective industrial courses in High Schools* instruction in the principles of agriculture and the domestic and mechanic arts;
2. That in addition to day courses cities and towns provide evening courses for persons already employed in trades; and
3. That provision be made for the instruction in part time day classes of children between the ages of 14 and 18 years who may be employed during the remainder of the day, to the end that instruction in the principles and the practice of the arts may go together"

After so clear a statement of the case there is no need to say more except to emphasise the means suggested as proper for the achievement of the object in view, namely, the provision of new elective industrial courses in High Schools. Elective industrial courses in High Schools are precisely the reform suggested in this Memorandum.

To give a concrete instance of the type of institution that would result from the application of these principles, reference may be made to the Springfield Technical High School in which there are three courses—a General course which is compulsory for all and specialised courses for general culture, scientific studies and commercial and industrial pursuits. It provides that "in

all the courses without exception the boys shall take drawing and shop work and the girls sewing and cookery." There has been much debate in Mysore whether if Industrial courses are introduced it should be made obligatory on all to take some one course or another, whether they intend to specialise on the industrial side or not. The answer of Massachusetts seems to be in the affirmative.

That a combination of general education and vocational instruction is necessary is proved by the universal experience of Europe as well. In the London Trade Schools even, 8 hours are given to English and general studies, 8 to 10 hours to Mathematics and science and 8 to 10 hours to drawing and Manual work.

In some of the French Schools the Trade Courses are both theoretical and practical. The theoretical include French language and literature, History and Mathematics, science, music and gymnastics. General courses are in some places held in the forenoon and the Trade courses in the afternoon.

There is no need to multiply instances and the discussion of the project in hand may now proceed with reference to local conditions and needs.

The general disinclination and debility shown by educated Indians towards manual pursuits has given rise occasionally to the view and since education has had a paralysing effect on physical and practical activities, it would be better to organize industrial schools as separate institutions unconnected with the general schools and give in them little or no general education so that the evils which are supposed to result from general education may be altogether avoided. Thinkers of this school seem to be of opinion that whether it is desirable or not, it is necessary, in view of the peculiarities of Indian character and temperament to wean away those who are to spend their lives as Industrial workers from general education. On this view the Technical schools will be purely practical institutions in the programme of which general culture will not be included or will be included only to a very small extent. The general schools will continue to be what they are at present, because on their hypothesis general education and manual occupation are incompatible with each other. There is therefore no sense in introducing technical courses in general institutions in which they can never take root and flourish.

If this view is accepted as correct it would result in the production of two classes of men one possessing general culture and capable of taking part in public life and administration, but utterly useless for industrial occupations; and the other, the industrial workers and the tillers of the soil who will not be capable of exercising through lack of education the influence that is generally regarded as necessary for the welfare of the State or public life and administration. The antithesis between the educated man and the industrial worker is an admitted evil and unless their reconciliation is considered to be absolutely impossible, every means that has even a small promise of success should be tried in the interest of the people at large and of the State. If it is held that progress is in the direction of democracy such a reconciliation must be attempted at all cost as otherwise the masses would be unfit to discharge the functions that may devolve upon them.

But in point of fact the very principle of the above argument is vitiated by a serious fallacy. The fallacy, namely, that because the *present* system of education has produced a distaste and a disability for manual work therefore education *as such* will produce the same consequences. It does not seem to have struck thinkers of this school that if the very system of education given is changed and manual occupation suited to the different grades and ages grafted on it right from the beginning, the dissociation between education and manual occupations could not only be avoided, but that education could be made,

as thus reformed, an active agent for bringing about happy association between the two. If it is true that the present mode or type of education has not promoted but rather retarded the love and capacity for physical labour, then it is a very good reason why the present system should be modified and no reason at all why the industrialist should be consigned to ignorance or to a culture of very inferior type.

Such a modification of education is rendered absolutely imperative by the introduction of compulsory education. If it is true that education has a paralysing effect on the hand than since the majority have to live by the toil of their hands in field, factory and workshops, there would be no justification for compelling them to get educated unless the education given be of a type that would not be antagonistic to their careers as workers. If it is argued that compulsory education obtains only in regard to elementary education, the answer is that an elementary education which does not leap up to and which is not intended to lead up to secondary education is a questionable gift which can have no place in a system of co-ordinated stages of education. It therefore follows that in future the introduction of vocational, industrial courses not merely in separate schools but as a part, elective or compulsory, of the general education given in the State is desirable and necessary.

It may be said that if such courses are introduced very few would take to them. Prophecies of this kind must be put to the test before they could be believed in. Personally speaking after much direct experience of the inclination and capacity of the youth of our country, I have come to the conclusion that Indian youths who are not, in youth, before the environment has produced all its effects for good or bad, very different from youth elsewhere, will take as readily and greedily to manual occupations and technical education as the youth of any other country in the world. Human nature is more nearly the same everywhere in infancy and youth than it is at a later stage of life; and there is no need either on the ground of experience or psychology to take an unduly pessimistic view of the potentialities of the youth of our own country.

In one respect the proposals submitted in this Memorandum have already been accepted in principle and embodied in our regulations. Nothing more novel is proposed here than giving them life and reality, adopting ways and means by which the theoretical recognition would be translated into fact and actuality.

Industries and agriculture are at present included under division C of the subjects which would be taken for the S. S. L. C. course. As division C does not lead up to the University course it has never been and never could be popular. Youth is ambitious and no educationist, no man with a heart could expect youth to choose subject which limits its careers to a High School certificate while other vistas are stretching before its eager vision. What is proposed therefore is the transference of these subjects from the C to the B Category.

That such a translation will at once attract a large number of students is proved by what has happened this year in respect to commerce. Commerce was till a year ago in division C and not many took up that course. This year under orders of Government it was transferred to division B—the division that leads up to a University Course; and though the classes were opened some time after the schools were opened and got into working order, more than 200 students have joined these classes.

Pedagogics though still in Division C has attracted over 80 men as soon as provision was made this year to teach the course. "C" Courses should be discouraged and avoided as they involve overtime work and are injurious to the health and mental development of pupils in adolescence when they

should not be given too much of sedentary work or studies. However these facts are enough to disprove the allegation that educated Indian youths have a constitutional repugnance for professional and vocational courses.

The S. S. L. C. course as it stands now does embody the principle and policies here recommended, but in an unsystematic and uncoordinated manner. Moreover there is very little scope even now for the play of expending physical energy of the adolescent boy and no variation from purely intellectual pursuit worth the name has been so far secured. This as the discussions above have revealed is the cardinal problem of education, and unless this is solved no approach could be said to have been made towards that ideal of education in which the cultural and the practical will shine in happy conjunction shedding a healthful ray on the path of national progress.

The remedy is believed to be the provision of courses of study which will rouse and sustain interest while from their nature and correlation of mental and physical faculties will be automatically secured. Such courses must necessarily include a great deal of hand work in specially equipped training rooms and must be devised so as to provide enough choice to the more muscular of our students, who either from inclination or defect cannot be expected to reach the same high standard of purely intellectual work, as the more bookish of their fellow students.

While thus depriving the more muscular students of the chance of learning work to their taste, the existing courses of study create in so called success too, a studied indifference, if not antipathy to a mechanical turn of mind, which under present day conditions of industrial development and general advancement, shuts them out from an intelligent participation in affairs that should have a natural claim on their attention and interest as men of culture. Such an outlook can be developed only when they are under training in the schools, and when such training includes a handling of tools associated with an industry adapted to the particular locality.

If these ideas be kindly accepted by Government and the effective inclusion of industrial subjects in the general educational courses conceded as it has already been in theory, the next point for consideration would be the stage at which the student should start such work in view of the level of knowledge and physical development required. Industrial training of any kind presupposes a definite stage of muscular development, the primary factor involved in the manipulation of tools, and the minimum age, in the case of Indian students may be fixed at thirteen or fourteen. Before this age, they are not generally developed enough to take to such work except agriculture and gardening, without overstraining themselves, and in addition to the general standard of knowledge also attained will not enable them to follow intelligently the line of thought underlying the processes taught in the workshops.

In respect to the age at which industrial training properly so called should be commenced the practice and precedents of foreign countries are conclusive. In England it is from 12 to 14 years of age in what are called elementary institutions which really correspond to our Lower Secondary grades. The London Technical Day School—Minimum age over 12 years; Liverpool Day Technical school-Minimum age not less than 13; Scotland 12 to 14; France 12 to 13; Switzerland generally 13; and Berne 14.

As was pointed out in this office No. D. O. 23 dated 9th July, 1911, dealing with Agricultural Education in the Lower Secondary Schools manual occupation will not be altogether unprovided for even in the Lower stages. A good system of kindergarten, school gardens and agriculture would give sufficient occupation for the younger pupils and serve to keep their body and muscles in tone. As has been pointed out by the Industrial Commission of Canada, in the lowest

grades, in order to prevent the capacity for Industrial pursuits from suffering attrition and to give a fuller development to such capacity as is innate, the following provisions should be adopted.—Nature study and experimental science, free vocational work, organized and supervised play and game, more and better singing, paper folding, clay modelling, school gardening and other manual occupations. In the Lower Secondery grades in all rural schools Agriculture may be introduced and in the City schools some alternative for agriculture in the shape of practical instruction classes may be organized. But if agriculture and practical instruction should become an organic part of the educational system the present Lower Secondary curricula will have to be revised and consolidated. To continue to keep practical agriculture and practical instruction as extras which may or may not be attended to is to place them at a discount and to render them less popular than they would otherwise be. If Government approve of this idea a detailed scheme which is now under consideration will be formulated and submitted. The present memorandum deals only with the High School courses.

Technical instruction properly so called should first be attempted in the High School courses, and the S. S. L. C. scheme still further broadened out so as to include industrial subjects also. The question would arise here of the desirability or otherwise of making the industrial training compulsory in the case of every pupil in the High School course, and this must be decided by considerations of economy and of efficient administration. Economy, because when compulsion is introduced the equipment and the teaching staff and materials will be utilized to their fullest capacity and the net cost to Government per student of such training will then be least. Secondly, a greater range of subjects can be organized, as when all the students have to take up an industrial subject, different aptitudes have to be met differently. Thirdly, the enthusiasm of the teaching staff will be sustained, as there will be a sufficient number of students in each branch of industry, which will not be the case when such studies are made optional.

No possible objection to such a course would come either from the pupils or the parents of pupils inasmuch as Sloyd is now compulsory, in place of which and for the hours now given to it an industrial subject will be introduced. Aided institutions which may not be able to provide for such varied equipment as this, would have to be given larger grants. However until the idea of compulsion is found to be agreeable, the subjects of study for the S. S. L. C. may be regrouped and widened out as shown below :—

COMPULSORY SUBJECTS

1. English.
2. Vernacular
3. Mathematics (Elementary)
4. Indian History and Geography
5. Elementary Science

OPTIONAL SUBJECTS

1. English History and Commerce
2. English History and Economics
3. English History and Sanskrit or Persian
4. Physics, Chemistry and Natural Science and Mathematics
5. Agriculture and Sericulture
6. Industries, one of the following :—
   (*a*) Carpentry and Cabinet making
   (*b*) Smithy
   (*c*) Machine shop and fitter's work
   (*d*) Pattern making and Foundry work
   (*e*) Printing and Book-binding
   (*f*) Weaving
7. Pedagogics and part of the above groups.

It is estimated that at least five hours will have to be devoted every week, for the three years of the High School course, for successful and profitable instruction in any of the

Industrial subjects. Such a provision does not make any very serious inroad into the total time available for the entire High School course.

Separate subjects, suitable to lady students will have to be provided, but considering the number of such students in the schools, it will be a mere matter of detail and could be arranged for when necessary.

It will be noticed that the scheme as presented here does not in the slightest prevent the student who has a natural aptitude and inclination only for what are called subjects of general interest from specialising in that line and going up to the University for the humanities or pure sciences. What little compulsion of a vocational character is here recommended is recommended purely as an alternative to Sloyd which is now obligatory on all students though in point of fact owing to lack of facilities a good percentage of them get little or no Sloyd practice. The basic principles of the existing system of High School Education remain intact and *unimpaired; only other course are introduced* and left to the option of the students which cannot be regarded as in any way cramping their choice or hindering general culture. In fact the charge of cramping choice lies against the system as it is in operation now. The student under existing conditions has little or no choice except to consign himself to general culture and its disutilities if he desires to have a chance of going up to the University.

The cost of including such instruction in the general scheme of the S. S. L. C. will naturally depend upon the locality, the strength of pupils in attendance and the industries taught. Such cost is usually made up of charges under the head of (1) building, *i.e.*, workshops aud practising rooms, (2) equipment, (3) teaching staff, (4) materials for work. Of these the first two would be non-recurring and the last three recurring charges. It is usual in framing estimates to assume that a dozen students is the maximum number that a teacher of industrial subject can conveniently teach and supervise, and figures are given on the assumed attendance of 12 pupils at a time. The most costly of the subjects will be machine shop and fitters' work and the least costly will be carpentry and cabinet making.

Table of maximum and minimum Charges for 12 pupils (at a time.)

Machine Shop		Carpentry and Cabinet-making
Non-recurring—		
1. Building	3,000	1,500
2. Equipment	...	5,000
(a) For chipping and filling ...	1,000	...
(b) Machine work ...	8,000	...
(c) Tools	2,000	...
Recurring—		
3. Subordinate teaching staff ...	120 per month	100
4. Materials	(Depend altogether on the locality)	...
5. Tool replacement	100 about would be fair	50

The total cost of the introduction of *industrial optionals in the High School* courses will depend on the number of industrial subjects to be taught at each High School. The following tentative distribution of industrial optionals is proposed for each centre, *though it is not intended* to open all the courses immediately or at the same time:—

Distribution of Industrial subjects according to locality	Name of centre	Nos. of Industrial optionals proposed
	Bangalore	a to f (vide list on page 14)
	Mysore	do
	Channapatna	a to d
	Hassan	do
	Chikmagalore	do
	Kolar	do
	Chitaldrug	do
	Chikballapur	do
	Shimoga	do
	Tumkur	do
	Davangere	do & f

An average cost has been assumed of Rs. 3,000 for a work room for each industry and of Rs. 7,000 for equipment under non-recurring expenditure.

In framing the estimate of recurring expenditure on account of such instruction, two important points have to be considered. The first refers to the question of the efficient supervision of such instruction, until the whole scheme is systematized and we may have to employ as Head-masters at any rate for the two most important High Schools at Bangalore and Mysore persons with sufficient qualifications and experience of such work elsewhere. We may perhaps have to import men from England, who had been supervising such instruction in the more important Polytechnic Institutes, and we may have to pay each of these a substantive pay of Rs. 500 rising to Rs. 700 in the course of five years, the period for which we would contract for their services. If the Government are pleased to accept such an arrangement, I may be permitted to address the Board of Education in England and my academic friends for suitable candidates, and for the details of pay and service that they would recommend as suitable. It may be assumed for the purposes of calculation, an average salary of Rs. 600 per mensem for each of the two Head-masters under reference will be required.

There would then remain the question of charges on account of the subordinate staff and of the materials for work and replacement of tools. It is believed that an expenditure of Rs. 120 per mensem would have to be incurred for the subordinate teaching staff for each of the Industries taught, and of Rs. 80 per mensen on an average for materials and tool replacement. These figures are based upon an assumed strength of 50 boys in each class of the High Schools and no difficulty is anticipated in the drawing

up of the actual time tables and work distribution. The instruction in industrial subjects is proposed to be imparted during the afternoon hours, when it will be possible for the work in the shops to be continued beyond the duration of the normal school day without encroachment upon the hours to be devoted to other objects.

As outlined in the table above there would have to be provided (2×6 plus 8×4 plus 1×5) 49 Industrial optionals, at an estimated cost of a non-recurring expenditure of Rs. 4,90,000 and a recurring annual expenditure of Rs. 49×12×200 or 1,17,600 on materials and subordinate staff, and of 2×600×12 or Rs. 14,400 on the two important Head-masters, or a total of Rs. 1,32,000 per annum.

The actual expenditure on the ten existing High Schools with their general educational subjects only totalled in 1916—17 to Rs. 1,35,645 and it will be seen that when this scheme comes into operation and is in *full swing* the recurring expenditure would be only doubled. It will be no exaggeration to say that the wider outlook created in those under instruction by such training and the economic value to the State of the finished products of such a system would far outweigh the extra expenditure incurred, and would go a very great way towards creating the necessary industrial atmosphere, which is usually associated with all the advanced countries of the West, and which affords the very breath of life for every kind of successful industrial enterprise.

These classes may also serve the purpose of continuation centres. There is nothing in the scheme outlined above to preclude the possibility of full time boys who are not in attendance at the High Schools taking advantage of the courses of instruction offered, and it would follow as a natural consequence that when the system proposed is worked to its full capacity, the District Head-quarter Industrial School now run as a separate unit, will all be absorbed in the new type of Polytechnic High Schools and the funds now separately budgetted for these schools will be made available for and merged into those of High Schools. Also evening classes may be held.

This scheme will constitute the first attempt to unify and expand Secondary Education on an unprecedented scale in the State, for, while on the one hand, it will tempt pupils of enormously varied aptitudes into joining and benefitting by the type of schools proposed, it will on the other hand by the consolidation of types, help to evolve an uniformity and integration which will guarantee efficient inspection and a steady and watchful programme of development.

With the enormous expansion in education achieved in recent years it has become incumbent on the State to increase the accommodation in the High Schools. Government are aware how constant demands are pouring in from different quarters for starting new High Schools. More than ever the State is confronted with the problem whether it would multiply the present type of schools and with them be responsible for a large increase in the number of men who are sent out every year with general education which either does not fit them or ill-fits them for the struggle for existence or whether Government would take advantage of a situation wittingly or un-wittingly created to secure the increased accommodation required by introducing a fruitful variation of courses which would not only absorb the students who pass out of the Lower Secondary grade but enable a large number of them to fit themselves for life during their Upper Secondary career. It cannot be too strongly emphasized that the key to the educational organization and the general life of every community is the Secondary School which is best represented in India by the High School. This is the great lesson of Mr. Fisher's recent reforms. It can be seen why the Secondary School is the centre of educational and national interest. The primary pupil is dependent on the parent for his livelihood.

When he leaves school he goes back to the parental roof and is not expected to be in a position to earn an independent livelihood. The High School graduate is enough of a boy to be able to pursue higher courses of study and enough of a man to be free from dependence on the parent and to start on an independent career. There is no exaggeration in saying that the complexion of the secondary-school determines the complexion of the country. I can here enter on a discussion of the part played by the secondary schools in the different countries in Europe and what lessons they have for us, but the foregoing ideas and suggestions are, I feel, adequate for the purpose in hand. The secondary school should be a preparation for every variety of manhood's tasks and duties. It should therefore be of the complex type here advocated and should cease to mould students on that narrow and monotonous pattern which has brought on the educated men of our country so many troubles and so much of just reproach.

If Government are pleased to accord their sanction to the scheme, details of the working plan to be adopted in the case of each individual High School to be brought under its operation will be prepared and submitted without delay.

I append the proceedings of a Sub-Committee of the Education Committee which show how expert opinion in the State welcomes this solution of a problem fraught with momentous consequences to our State.

The cost of opening Agricultural and Sericultural classes will be worked out separately in consultation with the Agricultural Department and a detailed scheme submitted. The organization of an Agricultural faculty in the University commits Government to the proper and prior organization of the introductory courses in the High Schools, as otherwise the Educational system of the State will lack co-ordination and integration. Government have held out a hope of sanctioning the proposals of the Department for opening Agricultural classes in the Lower Secondary stages and sanctioned arrangements for the training of the necessary number of teachers; if Agriculture is included in the Lower Secondary and University stages it will have to be included in the intervening stages as well to prevent a gap, for which no justification could be adduced, being formed.

WHAT IS EDUCATION?[1]

By PRINCIPAL LAURIE,

Heriot Watt College.

THE special department of education with which I am most familiar is that of the application of science to industrial problems from the scientific expert to the skilled artisan, which is generally covered by the description "technical education." As a result of my experience in this sphere I am strongly opposed to the recent expressions of opinion in favour of what is called vocational education.

The country is beginning to realise the extent to which it has neglected the training of the scientific and technical expert, and is now trying to devise a method of doing this on the cheap by robbing some of the valuable years when a boy spends at school, for the purpose of specialised scientific and technical training, which should be left over until the boy is older. There seems also to be a delusion that in doing this we are following the practice to be found in Germany. In Germany it has been the custom to keep a boy at school until he is at least eighteen before admitting him either to a university or to one of the technical Hochschulen and to keep his education up to that age on broad general lines. Even in the Realschule, which is supposed to be specially devised for boys who are going to enter the technical colleges, there is nothing that can be called vocational training.

It is also a mistake to suppose that much time is devoted to the teaching of science to boys in Germany. The science teaching is very largely mathematical, and Germany has not wasted enormous sums of money urgently required for the purpose of providing efficient laboratories in the universities and technical colleges, on school laboratories nor

[1]With acknowledgments to the (Scottish) Despatch.

are the educational authorities in Germany in favour of the waste of so much time in school laboratory teaching.

WASTED SCHOOL BOYS.

If we wish to find a perfect example of vocational education we must look back to the days of primitive man when the child's education was vocational from the moment he was able to walk and speak, and the result of the vocational training was the primeval savage. To the extent to which the child's education has ceased to be vocational, and has been devoted to the general development of the child intellect, has civilization progressed.

Most of the time spent in the laboratory in modern schools by children under sixteen is wasted. The school laboratory should be more in the nature of a workshop, and the pupil should be made to construct in most cases his own apparatus, and then be made to note not only the extent to which he can get results, but also the limits of accuracy obtainable with such simple apparatus. If members of school boards would visit South Kensington Museum and inspect there the apparatus designed many years ago by Professor Guthrie for use in schools, they would realise that they could save the greater part of their apparatus account, while at the same time improving the educational value of the instruction given.

Attempts have been made to obtain from scientific teaching an intellectual training for the child. Speaking broadly, these attempts have failed. The natural tendency of the child mind, just as it is the natural tendency of the adult mind, is to avoid the painful process of thinking, and substitute the easier road of memory.

INSTRUCTION IN THINKING.

School-masters have always been told it is their business to train the child's thinking capacity, but they are not told how this is to be done, and the proposal to do it by means of the heuristic method in science teaching is simply a fraud upon the public. If a child were really meant to re-discover, let us say, the composition of water, he would require the brain of a Cavendish to accomplish it.

On the other hand, the school-master has had, and has used for generation, two absolutely certain methods of compelling the child to think. One is to set him down to solve a "rider" or an original proposition based upon his knowledge of geometry. Here the child must think and must understand, and no memory will help him. The other and equally effective method is to set him to turn a piece of English into Latin prose. It is difficult to devise any other method which can be relied upon infallibly to compel the child to think without any possible escape.

Every child should be given an intelligent knowledge of the more obvious facts of nature which are coming constantly under his observation: the simpler facts of botany; the sun, moon, and stars; wind, clouds, and rain; and the simple obvious geological facts to be seen on the surface of the earth, all of which may be defined as nature knowledge.

The courses of science at present given in the Scotch Higher Grade Schools are quite unimaginative, and are of doubtful educational value. What is the use of wasting the time of a child in making a series of experiments to prove the relation between the pressure and the volume of a gas, an experiment for the verification of what is known as Boyle's Law. After all, a knowledge of Boyle's Law is not essential to salvation.

UNDEMOCRATIC.

If the Scotch Education Department made an elementary knowledge of science compulsory for the Leaving Certificate there would be a good deal to be said in favour of such a decision, but the present system of compelling every immature child to learn the

elements of science for the intermediate Certificate, a large number of whom never continue their studies, and in the course of a year or two have forgotten what they were taught, is a waste of public money.

There is another aspect of this vocation school idea. It is essentially undemocratic. It means that at the age of 12 every child's future is to be finally fixed. Unless he can pass certain examination tests his general education is to cease, and he is to be trained merely as a hewer of wood and drawer of water. In future the community is to be divided into two classes—and this division is take place at the age of 12—the class that is to receive the benefit of a general education and those others that are to be condemned to cease their general education. This division of society into two classes is to depend on the verdict of a school-master or Government inspector. The able brain is often the slowly growing brain. How many of the able men of to-day in business or affairs could have passed the school-master's test at the age of 12? How many of the school-master's pet clever boys ever come to anything? This is what some people call giving equal opportunities to all.

Continue the general education of a child on broad fundamental lines until the age of 15, no matter what class of society that child happens to be born into, and, in the case of the more capable child, until the age of 18 is reached, which is quite early enough for technical specialization. All that is necessary besides proper grading according to the child's ability is to make the courses of instruction sufficiently elastic to encourage any special aptitude the child may develop for art or science, literature or handicraft the indulgence of this aptitude being made a reward for faithful work in less congenial subjects.

AGRICULTURE IN MYSORE, 1917-18.

By "Rusticus."

THE progress made by the Agricultural Department can, in the case of most British Provinces, be measured to a large extent by the work it has done on one or two crops, jute and rice, for example, in Bengal, wheat and cotton in the Punjab or the United Provinces and rice and cotton in Madras. Mysore has no one outstanding crop and the Report of its Agricultural Department, interesting as it always is, suffers to a certain extent from this as it is bound to be a record of many miscellaneous activities. We agree with the Government review in thinking that it is not always possible to see the wood for the trees and that it would be of material assistance in this respect if each section of the Report were prefaced by a brief account of the outstanding results achieved during the year, which could then be followed by a detailed description of the work done in the divisions and districts.

Whilst some good work was done on the farms at Hebbal and Marthur, the new farms at Babbur and Naganahalli have not made a very auspicious start. In both cases, there was very great difficulty in obtaining labour, an obstacle to the development of the farms which should perhaps have been foreseen before the sites for them were selected. No work of any value can be done at Naganahalli until irrigation facilities are provided and there seems to be considerable uncertainty as to when these will be forthcoming. The delay is specially unfortunate as the primary object of this farm is the demonstration of improved methods of sugar-cane cultivation and sugar-cane is the last crop that could be grown without irrigation. Both at Hebbal and Marthur, the result o

the experiments was to confirm those of previous years, which is always satisfactory as it means that valuable time has not been lost. In both cases, it was again established that Red Mauritius cane is the best suited to Mysore conditions, though elephant cane is a heavier yielder at Marthur. Its size, however, renders crushing difficult. The three recommendations regarding the cultivation of sugar-cane which were made by Dr. Coleman in last year's Report are repeated this year and the example may be followed here. They are that the substitution of Red Mauritius cane for the varieties ordinarily grown will give an increase of 10 to 25 per cent per acre in the yield, that the use of oil cake at the rate of at least 100 pounds of nitrogen to the acre will give a net increase in value of over three times the cost of the manure which will be greatly increased by the use of double the amount, and that sugar-cane should not be planted in rows less than two feet apart, planting three feet apart being even better, if adequate supplies of manure are available. Next to the work on sugar-cane, that on ragi was the most important at Hebbal. Selected strains have now been evolved and seed sufficient to sow 1,000 acres has been distributed. On both farms, work on paddy was continued but this has not advanced far enough to enable seed of any improved strains to be given out.

The most striking feature of the district work of the Department was the development of sugar-cane cultivation. It is eminently satisfactory to find that Mysore can play a not unimportant part in reducing India's dependence on foreign countries for sugar. Over 60,000 sets of Red Mauritius cane were distributed in the Eastern Division and over 7½ lakhs of sets of foreign canes in the Western Division. The varieties distributed in the Western Division are not stated but presumably Red Mauritius was the most important, if not the only one. The figures sound imposing enough and undoubtedly mark a great extension but as the number of sets necessary for an acre is not mentioned, it is impossible to estimate their real significance. That cultivators are becoming increasingly alive to the importance of using suitable manures for sugar-cane is shown by the fact that 720 tons of ground-nut cake were distributed in spite of its high cost.

A point to which the Agricultural Department in Mysore has always paid special attention has been the popularization of improved implements. Work in that direction has been greatly hampered by difficulties in obtaining the implements themselves and spare parts and by difficulties in transporting them where they are obtainable, owing to the restriction of railway facilities. However, 467 ploughs and 51 cultivators were sold in the Eastern Division and 719 ploughs in the Western Division. Unfortunately, the Public Works Departments was unable to come to the assistance of the Agricultural Department in developing this branch of the latter's work. The new Bar share ploughs it manufactured proved unpopular on account of their weight and lack of finish whilst most of the sugar-cane mills developed serious defects and had to be taken back. The interesting suggestion is put forward in the Report that Government should establish a factory for the manufacture of agricultural implements. This seems attractive at first sight but we doubt whether such a factory would be a sound economic proposition. In order to be a success, it would be necessary for it to work on a large scale and large scale industries are seldom run satisfactorily as State concerns. It would undoubtedly be a good thing if agricultural machinery could be manufactured in large quantities in this country and it is much to be hoped that, in these days, when new enterprises are being floated in India almost every day, capitalists will turn their attention to this industry before long. One solution would be for Government to take a proportion of the

output of any factory established on sound lines at an agreed price.

As to other lines of district work, the large number of estates inspected in order that advice might be given in regard to such matters as proper drainage, the growing of manure crops, and remedial measures against insect pests furnishes gratifying evidence of the increasing confidence shown by landholders in the Department. We are sorry to see that the practice of transplanting paddy, in preference to sowing it broadcast, makes very slow progress in Mysore, the area transplanted being still counted in tens of acres instead of, as it should be, in hundreds. Green manuring, on the other hand, is spreading rapidly, especially in the Eastern Division where the Department was not able to meet the demand for sannhemp and daincha seed. In last year's Report, promise was held out of a revival of the cultivation of Indigo in Mysore but this so far has come to nothing. The reason apparently is that too long a time has elapsed since it was last grown in the State and that the methods of extracting the dye have been forgotten. Mr. Krishnayya, the Officiating Director, considers the cultivation of indigo worth reviving both on account of its intrinsic value and also on account of its use as a rotation with ground-nut. He has, however, no concrete suggestions to offer beyond recommending that, if it is revived, it should be grown on a fairly large scale and that the manufacture should be demonstrated on one of the Government farms. The Government point out that the question particularly affects the dyeing industry in the State as there is bound to be a considerable deficiency in the supply of dye-stuffs for some years to come. They, therefore, direct that the attempts to revive the industry should be followed up until some practical conclusions can be reached.

The suggestion in the Government review that each section of the report should be prefaced by a brief account of the outstanding results achieved during the year applies with special force to the work of the scientific branches. In the case of the entomological section, for example, the reader is told that a large poster illustrating the stages of *Kumbihula* (*amsacta albistriga*) and the methods of handpicking, which was the first of its kind to be issued in India, was distributed during the year but he is not told what crops this pest attacks. He is also told that a remedy for the pulse-beetle has been devised and that it is of such an extremely simple nature that it is within the reach of the poorest ryots. He might have been informed what it is instead of being referred to a bulletin which is in the press. The valuable work done on the entomological side during the year, including as it did great progress in dealing with coffee-borer and sugar-cane borer, is obscured by the method in which the results are presented. On the mycological side, the spraying of arecanut trees with Bordeaux mixture, seems to bid fair entirely to stamp out the *Koleroga* disease.

We should have been glad to know more about the courses at the Hebbal and Chikkannanahalli agricultural schools. It is clear, however, that the education given at Chikkannanahalli is eminently practical. The students themselves did all the work necessary for the making of such agricultural implements as wooden ploughs, and mhote fixtures whilst rings, chains, sickles, pincers and cultivator blades were turned out in the blacksmith's shop. The school is doing valuable work as a centre for spreading knowledge of improved agriculture and as an out-agency of the Agricultural Department. It maintains a branch implement depot, raises seeds of improved varieties on its farm for distribution to the local ryots, demonstrates improved methods and lends out improved implements, whilst its Head-master is frequently consulted by the local cultivators. The experiment in imparting

agricultural education in elementary schools which was referred to in the review of last year's Report has not been extended. In fact, in one school, that at Varthur, it has been discontinued owing to lack of a sufficient number of students and of suitable land for practical instruction. A modified scheme has been submitted for the approval of Government but no details of it are given.

An interesting estimate of the monetary value of the work done by the Department during the year is given in the Report. The total is put down at Rs. 1,75,000 of which far the largest item is the increased revenue to sugar-cane growers due to the 720 tons of oil cake sold by the Department. This is estimated at Rs. 1,05,000. The improved methods of cultivation resulting from the use of the implements sold by the Department are calculated to yield about Rs. 50,000. Rs. 6,000 are put down to the introduction of a better yielding variety of sugar-cane and Rs. 3,000 to that of improved strains of ragi. The increased income to the cultivator resulting from the adoption of such practices as green manuring, single seedling transplantation of paddy, and the distribution of cotton, ground-nut, turmeric, etc., is estimated at Rs. 7,000. The Government consider this satisfactory so far as it goes but add that it is by no means commensurate with the amount of energy and money expended nor is it proportionate to the increase of 40 per cent in the total production in the next ten years forecasted by the Director of Agriculture in a note submitted to the Economic Conference. For our own part, we think that the Agricultural Department has been too modest in its estimate of its achievements and that many of the items in the account, such as the increased values due to the distribution of improved strains of ragi or of ground-nut and cotton seed have been pitched too low. Nothing has been allowed for the preventive work done by the mycological and entomological sections though the indirect results of this increasing yields or rather in preventing their diminution must be considerable. None the less, it is distinctly disappointing that so much of the monetary value of the work done by the Agricultural Department should be attributable to the use of manure and of improved implements and so little to the introduction of improved strains when it is remembered what has been accomplished in other parts of India by the introduction of Pusa No. 12 wheat or of Punjab 4 F. or *Karungauni* cotton. The estimate of the money value of the work accomplished by the Department would have been more enlightening if the total expenditure on the Department had also been given. This is an omission which should certainly be rectified in future Reports.

One small point must be noticed in conclusion. The Report on the work of the botanical section states that, among the American cottons, New Orleans gave the best results and that this has been confirmed by the Bombay Agricultural Department. This statement is not borne out by the recently published Reports of the latter Department. These show that it is doing its best to eliminate New Orleans from the mixture, known as Dharwar American and is concentrating its attention on the other constituent of the mixture, Upland Georgian. There is evidently a misunderstanding somewhere and we would suggest further communication on the point with the Bombay Agricultural Department.

IMPROVEMENT OF COFFEE IN MYSORE.

By D. W. Meppan,

District Economic Superintendent, Kadur.

COFFEE was introduced into Mysore about 300 years ago the seed supposed to have been brought by Bababooden who settled on the Chandra Drona Range gave the hills his name and sowed the seed brought from Mecca. Some of the plants are said to be still existing at the shrine. From the seed of these plants all the original coffee in Mysore is said to have been obtained and from Mysore taken into Coorg and was said to have been first planted at the Nalknad palace.

Up to about 1873—74, all the coffee planted came from this stock and planters began to notice that their crops were falling off, the stems of their old trees litchen covered, gnarled, wornout and unresponsive, poor spindling wood following the pruning, small clusters of berries and poor and irregular crops resulting, *and Leaf disease*. Planters began to look for more vigorous types of coffee. About 1873—74, the exact year is not known, a Cricket Team visited Coorg and two of the members, Messrs. Jupp and Stephenson were so struck with the vigour of the Coorg coffee plants that they got seed from Coorg. This seed was probably from the same stock as that of Mysore, but cultivation in the open and more liberal treatment had produced a hardier, more symmetrical and prolific plant.

The first Coorg seed most likely came from the late Mr. J. P. Hunt's "Glenmore" and was planted at "Aigoor" and "Chandrapore." The plants raised from Glenmore seed were a beautiful shape—the primaries growing for 2½ to 3 feet at right angles to the stem and then drooping in a graceful curve, the matured secondaries drooping and giving light for the new wood. It was a really beautiful compact healthy plant with a fine spread and a very heavy cropper. The imported plant began to be known as the "Coorg" and the indigenous variety as "Chik" short for Chikmagalur—the centre of the coffee market.

The "Chik" was very different in shape and growth to the Coorg.

The primaries of the "Chik" grew upwards and the first pair of secondaries always started at the tips of the primaries. Whereas with the Coorg the secondaries always start from the first pair of nodes nearest the stem.

The "Chik" was not an annual Cropper—every alternate or third year it gave a knockout crop and then rested. The bean was larger, fuller, better shaped, better coloured, better flavoured and more thickly coated often engrained with the silver skin. It fetched £. 10 to 20 a ton more in the London Market than Coorg coffee. When Coorgs were first introduced they were used for supplying vacancies. It was very soon noticed that in field of old Mysore or Chik coffee recking with leaf disease, the young Coorgs stood out prominently with every leaf on the plant, dark green, almost black, in colour, without a spec of disease.

In this connection it is interesting to quote extracts from what Mr. Browne of Kurki-Kunda a planter of over forty years experience says in his Bulletin on the "Coffee Industry in Mysore."

"The industry appears to have been in a flourishing condition until the sixties, when the old Mysore coffee, known more commonly as "Chik" coffee showed signs of being played out. Leaf disease appeared and accelerated its end. By the early seventies "Chick" plants would not grow and the industry seemed to be on its last legs—nothing but the introduction of a new variety of Coffee to take the place of the "Chik" could save it. Fortunately such a plant was found in Coorg, and from the

date of its introduction into Mysore, took place the renaissance of the coffee industry in the Province. It was found that this plant was to a great extent immune from leaf disease; plants put out as supplies in fields of old "Chik" which were ravaged by leaf disease were but slightly affected. The result was a boom in coffee, wornout Estates were replanted and new Estates opened

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and the out put of coffee per acre increased largely."

With the exception of some of the older more conservative Planters, who said the Coorg produced an inferior bean and Mysore would lose its good name, most of the younger men pulled out their old "Chiks" and replanted the land with "Coorgs." In this replanting it was found that many of the unresponsive old "Chicks" had hardly any feeding roots, the stems were bored and all the pores clogged so that the sap was not able to circulate. The plant was absolutely wornout suffering from senile decay and the only remedy was to replace it by a better cultivated, a healthier, more robust, more disease resisting plant and to do away with the effete old "Chik."

There are very few European Estates where any Chiks exist at the present day, where there are any, they are being steadily removed every year.

Since the introduction of the Coorg forty-five years ago, we find history repeating itself, what happened to the Chik has happened to the Coorg. The plant has become wornout. Planters find vacancies dont come on, new clearings are not so successful—plants lose their primaries, wood dies back the plant is susceptible to every kind of disease and becomes so enfeebled that regular crops are a thing of the past. In this connection Mr. Brown says:

"I have already pointed out that when the Coorg supplanted the old Mysore "Chik" it was to a great extent immune from the disease—It now suffers from it severely not so badly as the old Mysore tree at its worst, but sufficiently so to make it apparent that the time has come to look about *for another and more robust plant to take its place* more especially to replant estates which are declining from old age."

For the last fifteen or twenty years the Planters have been again looking for a stronger, healthier, more disease resisting, better cropping plant. Liberia, Jamaica, Costa Rica, Guatamala, Marogogipe, Golden drop, Robasta and various Hy-brids have been tried. Liberian would only do at low altitudes,—required a year to ripen and the coffee required special machines to pulp and mill it. Jamaica, Costa Rica, Guatamala—all get leaf and other diseases just as bad as "Chiks" or "Coorgs." Marogogipe declined to crop "Golden drop" a sport from Brazil is a hardy prolific plant but not free from disease. Robusta is a shy bearer at over 3,000 feet and requires twelve months to ripe its crop.

Several Hy-brids have been introduced and tried and so far as Mysore is concerned none of them have been what one may call an unqualified success.

All those that have been produced seem to be crosses between Liberian and Coorgs and more or less accidently discovered. Those grown in Manjarabad and sold from Rs. 10 to 20 a seer, do not seem to have come up to the anticipation and hopes of the buyers. About 40 per cent of the crop is "Jelloo", of the other 60 per cent a large percentage of the plants are like the Liberian, with large thick glossy leaves, straggling in shape producing coffee of various sizes and shapes and a good deal of "Jelloo." Some plants are absolute mules and do not crop at all and a very few perhaps 5 per cent look like "Coorgs" with a long narrow leaf and coffee berries of an uniform size—but the plants are uncertain croppers.

The Chendrapore Hy-brids over which Mr. Hamilton spent a good deal of time and

trouble do not seem to have panned out as well as was expected. There seems to be an uncertainty about the plants coming true to strain and although they are said to be the sixth or seventh generation, the cropping powers do not seem to have become fixed.

Mr. Jackson of Coorg is said to have produced a very superior Hy-brid said to be about the *12th* or *15th* generation, that comes true to type a fine robust, spreading—heavy cropping tree. The Coorg Government, to encourage him, have very generously given him a large block of virgin forest at Malambi and Mr. Jakson has twenty-five to thirty acres planted.

The following resolutions were passed at a Conference of Coffee Planters in Bangalore at which the Director of Agriculture in Mysore was present in June, 1915.

(i) "That better results can be obtained by selection and breeding methods with existing types of coffee than by importing seed of Arabia or other varieties from other countries."

(ii) "That selection methods on a systematic scale are absolutely necessary. The question of raising a robust disease resisting coffee plant is a matter that Government should take up at once. There is no doubt that the Coorgs like the old "Chik" is played out and unless a new and superior plant is introduced, the steady decrease in produce of coffee that has been going on for some years will become a serious matter and affect the economic and material progress of the Kadur District which is so dependent on coffee. Years ago Parry & Co distributed coffee seed free to ryots to encourage them to grow coffee.

Government should similarly buy the best available seed and distribute it to Planters especially the Indians, who are always backward in adopting new methods and trying new plants.

There is no doubt that of all the varieties of coffee introduced into Mysore for the last fifty years—be they Coorgs, Liberians, Jamaica, Santhos, Guatamala, Moragegipe, Golden drop, Robusta or the various Hybrids—none can compare with the plant raised by Mr. L. P. Kent of "Doddengooda" from his "selected" seed. The plant is not a Hy-brid—but of old Mysore type with a remarkably strong constitution, and the plants raised from the seed come absolutely true to type and do not, like every hy-brid that has been produced, throw back to dozens of different types of plants many absolutely sterile and useless and nearly all producing a large percentage of empty beans—"Jelloo."

This selected seed is a medium sized, plump coffee, reported on well in the London Market and classed by an eminent coffee expert of long experience, Mr. Holland, as typical of the old Mysore bean of forty or fifty years ago, eighty-five or eight-six bushels going to a ton of clean coffee. As many as 24,000 plants have been raised and planted out from half a bushel of this seed.

The young plants in a forced nursery—sown in February have five to six pairs of leaves uniform in size and appearance and when planted out in the field in good, bad, or indifferent land, as vacancies or new clearings, under old coffee, in dense shade or in the open, grow to plants of ten pairs of primaries in the year, and carrying every leaf down to the coteledons.

Two year old plants have primaries of 4½ feet long and are bearing crop at the rate of two to three Cwt. an acre which they mature, and show no sign of leaf disease or any of the primaries dying back.

A field of three years old plants, topped at 3½ feet have every pair of primaries down to the ground, the spread is ten to twelve feet, the stems thick and strong and the

primaries remarkably thick and carry a crop of 5-6 Cwts. an acre and crowded with wood for the coming year.

The growth is as good as what a field of first class Coorgs used to be, forty years ago. Most young Coorg charings with three or four Cwts. of coffee lose nearly all their leaves where the cluster of berries are—whereas these plants retain all their leaves from the stem to the end of the branch twelve to thirteen clusters on a secondary are common and twenty-five and thirty berries in a cluster.

The ten year old original trees have a spread of over 12 feet across and several were carrying a crop of about half a bushel a tree apparently without any effort.

A small field of ten acres of four years old plants bearing 6-7 Cwts. an acre a most marvellous sight; no matter what the shade tree, (even under tamarinds), what the soil, or aspect the plants are a uniform sheet and unless seen, one would hardly credit it being possible to grow such coffee in the time.

No manure has been applied until the last month or so and they have not received any treatment other than what is given to any other ordinary young clearing.

This type seems practically immune from leaf disease.

The introduction of this coffee is the beginning of a new and a very promising era in the History of the coffee Industry in Mysore. Mr. Kent is receiving orders for his seed from Africa, Java, Ceylon, Coorg, the Nilgiris and almost every coffee growing district in the world, and several Mysore Planters are planting this seed largely. Mr. Kent guarantees 100 per cent germination absolutely true to type.

It is a pity the previous history of these plants is not known.

All the information that Mr. Kent can give is, that he found a few very strong healthy plants in one of his clearings, and bred from them by netting the trees at blossom time.

Great credit is due to Mr. Kent for discovering and propogating this very fine type of coffee and in a few years, there will be many hundreds of acres of it distributed all over the coffee districts.

As is stated above it does not appear to be a Hy-brid, as it has none of the characteristics of all the Hy-brids grown in Coorg, Mysore, Java or Brazil. The plants from Mr. Kent's plants come absolutely true to type, bear extraordinarily and mature all they set, with no empty or "Jelloo" fruit and without the trees losing leaf dying back or suffering in any way.

The plant appears to be possessed of a very fine vigorous constitution with a very strong root growth and probably a much stronger root acid than the ordinary coffee plant, thereby being able to absorb a larger quantity of the available plant-food in the soil, material that is practically looked up, so far as the other known varieties of coffee are concerned.

The Forest Products Laboratories at Madison, developed from "clabber" (casein) taken from fine Wisconsin Jerseys a glue of remarkable adhesiveness. Wood blocks joined with it have held against ten days' soaking supplemented by twenty-four hours' boiling in water. The process is now available without cost of industry and enable any manufacturer of furniture to put together articles that will stand the test of any climate.

NOTE ON TOBACCO.*

THERE are two principal species of tobacco in India, *viz.*, *Nicotiana tabacum* and *Nicotiana rustica.* The former is the common tobacco of India, being grown all over the country. It is apparently the only species cultivated in the Peninsula and forms the most important source of the tobacco of commerce. The latter, *viz.*, the yellow-flowered tobacco (*Nicotiana rustica*) is widely cultivated in Bengal, Assam, the Punjab, and also in Kashmir. In some districts of the Punjab and also in Purnea (Bihar) it is said to be supplanting the cultivated forms of *Nicotiana tabacum*, while it is the prevailing species in the damper soils of the southern portion of the tobacco-growing district of Rangpur (Eastern Bengal). This species is smaller than *Nicotiana tabacum*, but hardier. It requires shorter time to come to maturity, but it is said to give a higher yield than *Nicotiana tabacum.* The most noticeable difference between the leaves of the two species is that the leaves of *Nicotiana rustica* are stalked.

The cultivation of tobacco is very widespread in Burma. The two main varieties are called "Burmese tobacco" and "Havana tobacco." Of the Burmese tobacco there are two main varieties "Seywet-gyi," the large-leaved variety and "Seywel-gyun," a smaller-leaved variety with pointed leaves. The former yields a heavier crop, but the latter gives better quality. There is always a great demand on the market for both the Havana and the Burma tobacco. The smooth leaves of the Havana plant are used for the wrappers and the coarser Burmese leaf for the filling.

AREA UNDER CULTIVATION.

The most important tobacco tracts in British India are:—(*i*) the Coimbatore and Dindigal tract of Madras, where the *Usi-Kappal* and *Wara Kappal* varieties are largely grown, the former supplying the *Trichinopoly cigar; (ii) the Godavari* Delta of Madras: (*iii*) the Rangpur tract of Bengal; (*iv*) the Bihar Districts of Bihar and Orissa; (*v*) Guzerat in Bombay and (*vi*) the delta tract of Burma.

The season for harvesting varies in different localities ranging from December to June, but the bulk of the crop is harvested during the months of February, March and April. The leaves when quite dry, are assorted and placed in heaps in stacks to ferment. They are then tied into bundles of 25 or 30, a useless leaf being employed for tying each bundle. The leaves are laid perfectly flat, the bundles being fan-shaped. In this condition they are baled, the broom-like ends projecting outwards. By varying the degree of fermentation of the leaves, different qualities of tobacco are obtained. A black variety is used in India for cake tobacco, and this is the most common product, but a certain amount of yellow leaf is grown for cigar making.

The statement below gives the acreage under tobacco in each province in British India during the past five years:—

* With acknowledgements to the *Indian Trade Journal.*

Acreage under tobacco in each province in British India.*

Province	Years 1913-14	1914-15	1915-16	1916-17	1917-18
Bengal	319,400	322,700	319,800	301,540	292,100
Madras	207,819	227,182	216,416	207,741	207,579
Bombay Presidency	89,491	88,467	91,513	95,077	102,423
Bombay Sind...	8,404	9,945	10,990	7,926	7,898
United Provinces Agra	60,797	85,159	68,648	83,722	66,885
United Provinces Oudh	14,611	17,621	16,102	15,047	18,299
Bihar and Orissa	115,800	105,500	118,400	118,100	118,700
Punjab	47,425	63,887	55,832	67,621	62,017
Burma Upper	34,003	32,539	25,320	27,573	27,078
Burma Lower	61,293	56,522	53,823	56,699	62,115
Central Provinces	12,061	15,935	17,642	16,514	18,455
Berar	14,146	13,318	14,414	10,891	12,469
Assam	8,431	9,512	8,514	9,677	9,539
North-West Frontier Province ..	5,421	7,314	8,566	11,687	8,230
Ajmer Merwara	2	25	24	37	60
Delhi	662	712	1,015	1,084	1,001
Coorg	34	11	19	7	14
Manpur Pargana	...	...	...	...	...
Total ...	1,001,710	1,056,349	1,027,038	1,030,943	1,014,862

*The acreage under tobacco in the Indian States for which returns are available was 51, 163 in 1916-17. Several important States furnish no returns. But as a safe estimate the total acreage in the Indian States may be put at 100,000.

YIELD.

The yield of tobacco varies in different localities ranging ordinarily from 160 lbs. to 800 lbs. per acre, the return under high cultivation being from 600 lbs. to even 3,200 lbs. per acre. Mr. N. G. Mukerji in his *Handbook of Indian Agriculture* (1907) says:—"A well-grown crop is expected to yield from 20 to 24 maunds of cured leaves per acre, the money value of which may be estimated at Rs. 100 to Rs. 120, Rs. 5 being the average price per maund of country cured tobacco." Taking the average yield per acre at Rs. 75 only (=say £5) the total annual value exceeds 5½ millions sterling.

EXPORTS.

The bulk of the tobacco produced in India is consumed locally. Nevertheless there is also a large and increasing export trade. The tables on the next page show the exports of tobacco (leaf and manufacture thereof) from British India during the pre-war year 1913-14 and the subsequent years and also the average value of the produce exported:—

Exports of tobacco (manufactured and unmanufactured) from British India during 1913-14 to 1918-19.

Articles	Quantity					
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
1	2	3	4	5	6	7
Tobacco—	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Unmanufactured	27,817,318	16,490,045	24,250,324	27,742,308	20,243,963	31,505,995
Manufactured—						
Cigars	1,825,635	1,733,959	1,557,735	1,135,481	1,004,364	870,644
Cigarettes	19,059	38,164	55,726	309,913	301,774	169,817
Other sorts	361,314	419,357	481,178	424,765	314,059	436,592
Total Tobacco ...	30,023,326	18,681,525	26,345,033	29,612,467	21,864,160	32,983,048

Articles	Value					
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
	8	9	10	11	12	13
Tobacco—	£	£	£	£	£	£
Unmanufactured	211,811	144,654	201,238	252,992	237,210	549,182
Manufactured—						
Cigars	102,435	92,686	83,628	67,265	67,527	63,388
Cigarettes	1,034	2,793	3,377	25,637	28,008	15,830
Other sorts	4,286	5,223	5,147	7,261	7,316	13,989
Total Tobacco ...	319,566	245,356	293,390	353,155	340,061	642,389

Average Value of Exports of Tobacco during 1913-14 to 1918-19.

Articles	Average value per cwt.					
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
Tobacco—	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Unmanufactured ...	0 17 1	0 19 8	0 18 7	1 0 5	1 6 3	1 19 1
Manufactured—						
Cigars	6 5 8	5 19 9	6 0 3	6 12 8	7 10 7	8 3 1
Cigarettes ...	6 1 6	8 3 11	6 15 7	9 5 4	10 7 11	10 8 10
Other sorts ...	1 6 7	1 7 11	1 4 0	1 18 3	2 12 2	3 11 9

It will be seen that notwithstanding higher rates of freight, scarcity of tonnage and other factors connected with the war, the exports of tobacco have maintained and even exceeded their pre-war level while there is an appreciable rise in values of the produce exported.

EFFECTS OF WAR ON EXPORTS.

Tobacco Leaf.

The bulk of the Indian tobacco exported consists of leaf, the kinds chiefly shipped being the "Bispath" (cheap country tobacco) and "Poolah" varieties of the Rangpore kind. "Bispath" has no market in the United Kingdom, but is largely used by the Dutch.

The varieties of tobacco leaf exported from the Calcutta Market are:—

From the Rangpur and Cooch Behar Districts—(*a*) "Selected Bispath," (*b*) "Ordinary Bispath," (*c*) "Motihar"—*of the size of* betel leaves, used mainly for chewing purposes, and (*d*) "Poolah"—Leaves large-sized and used for cigars.

From the Tirhoot District.—(*a*) "Moorun," a chewing tobacco=in two grades "Chutkee Moorun" and "Burkee Moorun," (*b*) "Kethpherry"—hookha tobacca, (*c*) "Doojee"—also hookha tobacco.

From the Purnea District.—"Mootihar'—hookha tobacco.

From the Orissa District.—"Gach," with stick and leaves, for country cigars.

From Burma.—(*a*) "Thindoor," (*b*) "Sindine." These are large leaf tobaccos used for cigar covers and cigars. (*c*) "Kooah"—a strong flavoured tobacco used for cigars.

From the Guntur District, Madras Presidency.—"Golden leaf" and "Jhootee" used in cigarette manufacture.

The statement on the next page illustrates the effect of the war on the export of Indian tobacco leaf and its destination and value:—

Exports of tobacco leaf from British India during the years 1913-14 to 1918-19.

Articles, and countries of *Final Destination*; also share of each Province.	Quantity						Value					
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
Tobacco— Unmanufactured—	lbs	lbs	lbs	lbs	lbs	lbs	£	£	£	£	£	£
United Kingdom ...	397,968	1,017,358	5,479,145	5,421,715	179,246	2,919,104	4,474	6,220	28,584	47,871	2,094	40,056
Cyprus	...	...	...	...	64,316	164,288	...	...	...	...	1,152	3,449
Aden and Dedpendencies.	9,789,105	6,416,069	5,204,346	5,824,871	4,273,317	6,410,863	79,608	65,553	63,780	69,985	68,816	104,459
Bahrein Islands ...	7,402	10,871	44,955	43,645	15,820	52,357	123	140	592	812	191	940
Maldives	13,328	23,696	25,760	24,883	17,005	15,288	239	464	371	525	297	281
Ceylon	180,803	107,618	110,529	90,216	78,973	79,784	3,021	2,012	1,930	1,520	1,270	1,375
Straits Settlements (including Labuan.) ...	2,200,871	1,984,509	1,840,552	1,938,089	2,494,724	3,043,319	24,395	25,223	22,712	24,325	30,899	53,891
Federated Malay States ...	435,704	451,500	534,251	902,267	1,011,583	1,163,189	5,502	5,943	6,597	11,270	12,860	20,652
Honkong	7,125,370	3,099,887	1,698,338	1,569,280	1,569,280	1,627,616	50,241	20,888	12,393	11,818	11,842	19,450
Egypt *(a)*	...	...	72,431	99,454	2,833,609	364,960	...	...	817	1,442	33,723	8,365
Mauritius and Dependencies	6,971	15,188	8,820	12,250	4,150	14,142	218	423	280	510	149	409
Other British Possessions.	5,918	2,658	1,609	7,938	199	3,009	68	38	22	103	6	37
Total British Empire ...	20,163,440	13,129,354	15,020,736	16,024,213	12,542,222	15,857,919	167,889	126,904	138,078	170,181	163,299	253,364
Germany ...	1,288,375	266,434	...	...	...	...	7,019	1,106	...	...	...	...
Holland	2,196,050	1,127,545	1,095	5,719,846	...	...	9,161	4,056	8	39,322	...	...
Belgium	353,860	37,380	...	...	...	...	2,406	140	...	...	...	...
France	3,576,923	1,667,050	7,539,204	5,092,708	5,915,003	13,085,489	22,829	9,583	43,975	32,817	51,592	261,833

Turkey, Asiatic—Red sea.	...	...	...	3,528	686	...	...	...	...	110	20	...
Persian Gulf ...	...	56,311	975,110	442,591	1,555,001	1,636,767	...	448	12,846	5,872	18,632	24,067
Maskat Territory and Trucial Oman. ...	38,594	33,499	24,274	42,314	10,107	36,795	331	371	228	424	159	426
Other Native States in Arabia	20,038	17,715	134,313	129,073	150,609	89,502	348	271	2,060	2,132	2,666	1,512
Persia	38,176	50,584	55,171	...	21,466	64,110	787	694	573	...	255	858
China (exclusive of Hong-kong and Macao) ...	...	17,618	42,000	...	...	240	...	178	275	...	...	8
Egypt (b) ...	35,456	2,254	...	...	...	...	287	18	...	...	...	...
Tunis	...	...	21,600	...	...	...	...	...	128	...	...	...
Morocco	71,175	...	358,920	288,000	...	614,160	468	...	2,127	2,133	...	5,004
Italian East Africa (Somaliland and Eritrea) ...	35,211	83,107	75,703	...	47,803	...	286	869	920	...	576	...
Japan	...	...	...	...	10	108,010	...	...	...	...	...	1,900
Somaliland (French) ...	...	...	...	...	...	11,680	...	...	...	...	...	183
Other Foreign countries ...	20	1,194	2,198	35	1,056	1,323	*	16	20	1	11	27
Total Foreign Countries ...	7,653,878	3,360,691	9,229,588	11,718,095	7,701,741	15,648,076	43,922	17,750	63,160	82,811	73,911	295,818
Share of Bengal ...	4,013,705	2,530,383	6,303,638	15,201,272	3,151,356	4,825,657	20,621	13,599	32,949	111,316	39,327	182,257
,, Bombay ...	9,874,318	6,541,701	6,343,050	6,242,424	5,572,698	7,472,332	80,722	67,073	79,284	76,861	86,789	120,444
,, Sind ...	39,172	88,733	245,106	262,820	694,082	906,385	374	966	2,563	2,841	8,275	14,797
,, Madras ...	2,234,511	2,362,763	2,269,552	3,489,397	2,987,372	3,749,071	29,281	31,001	28,520	40,740	39,060	69,714
,, Burma ...	11,655,612	4,966,465	9,088,978	2,596,395	7,838,455	14,552,550	30,818	32,015	57,922	21,234	63,759	161,970
Total ...	27,817,318	16,490,045	24,250,324	27,742,308	20,243,963	31,505,995	211,811	144,654	201,238	252,992	237,210	549,182

(a) Included in "Foreign Countries" prior to 1915.16.
(b) Included in "British Prossessions" from 1915-16.
* Value Rs. 5=6 s. 8 d.

As will be seen from the figures the chief pre-war destinations of tobacco leaf in order of importance were (1) Aden and Dependencies, (2) Hongkong, (3) France, (4) Straits Settlements, (5) Holland and (6) Germany. During the war period a considerable quantity is shown as exported to the United Kingdom. The bulk of the shipments were on account of Dutch consignees who took delivery in England and accepted the risk of being permitted to re-export to Holland.

CIGARS.

The cigar factories in India are centred in Madras and Burma. In the case of Madras "cheroots" there is no special grading of quality, as each exporting house has its own blends. Indian cigars weigh more than Cubans or Manillas.

The chief pre-war destination of Indian cigars was the Straits Settlements to which 1,438,613 lbs. wsre sent out of a total of 1,825,635 lbs. exported during 1913-14. The Straits Settlements still continue to be India's chief customer taking 722,959 lbs. out of 870,644 lbs. exported in 1918-19. The effect of war was to divert a portion of the exports to the Persian Gulf which absorbed 21,980 lbs. in 1918-19 against *nil* in 1913-14. The statement below gives the export figures for the last six years:—

Exports of Cigars from British India during 1913-14 to 1918-19.

Articles, and Countries of Final Destination: also share of each Province.	Quantity					
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
1	2	3	4	5	6	7
Tobacco—	lbs.	lbs,	lbs.	lbs.	lbs.	lbs.
Manufactured—						
Cigars—						
United Kingdom ...	86,033	60,289	71,846	76,155	39,015	49,417
Gibraltar	13,950	5,450	...	3,955	1,646	...
Aden and Dependencies.	7,830	5,525	7,560	2,126	722	1,429
Ceylon	5,990	3,086	7,224	10,526	1,142	6,785
Straights Settlements (including Labuan) ...	1,438,613	1,421,454	1,324,777	921,559	854,276	722,959
Federated Malay States.	163,428	188,688	80,848	52,972	33,014	20,713
Egypt (*a*)	...	...	8,263	9,073	14,171	11,517
Natal	713	503	56	434	200	44
Mauritius and Dependencies	4,899	3,350	4,419	3,946	4,742	2,956
Zanzibar and Pemba ...	...	100	249	260	1,208	790
East African Protectorate.	5,122	3,112	13,922	15,979	4,012	4,274
Bermudas	10,025	5,685	6,575	6,850	2,000	...
Western Australia ...	177	21	16	72	75	...
South Australia (including Northern Territory.)	399	125	248	108	...	175
Victoria	426	117	185	30	...	133
Tasmania	662	402	379	...	283	...
New South Wales ...	3,286	372	185	478	1,061	562
Queensland ...	50	209	41	143	...	...
Australian Commonwealth (Total)	5,000	1,246	1,054	831	1,419	870
New Zealand ...	4,561	4,758	3,704	1,908	799	808
Otber British Possessions.	2,672	2,518	4,294	1,458	1,212	336
Total British Empire ...	1,748,836	1,705,764	1,534,791	1,108,032	959,578	832,898

(*a*) Included in "Foreign Countries" prior to 1915-16.

Exports of Cigars from British India during 1913-14 to 1918-19.—*contd.*

Articles, and Countries of *Final Destination*: also share of each Province	Value					
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
	8	9	10	11	12	13
Tobacco—	£	£	£	£	£	£
Manufactured—						
Cigars—						
United Kingdom ...	8,325	5,270	6,880	7,376	3,381	4,461
Gibraltar	739	253	...	266	80	...
Aden and Dependencies.	626	414	597	216	49	108
Ceylon	542	308	473	789	88	908
Straits Settlements (including Labuan) ...	79,399	76,409	68,093	50,564	54,626	49,599
Federated Malay States.	5,269	5,858	2,473	1,786	1,231	850
Egypt (*a*) ...	...	...	924	1,040	2,146	1,733
Natal	166	94	1	102	41	3
Mauritius and Dependencies	341	223	302	263	299	206
Zanzibar and Pemba ...	...	5	14	29	111	73
East African Protectorate.	362	221	1,091	1,332	301	463
Bermudas	501	346	541	523	181	...
Western Australia ...	34	6	2	10	5	...
South Australia (including Northern Territory) ...	38	12	21	22	...	13
Victoria	57	8	20	2	...	34
Tasmania	48	33	28	...	32	...
New South Wales ...	373	38	22	78	138	72
Queensland ...	6	25	5	33	...	...
Australian Commonwealth (Total)	556	122	98	145	175	119
New Zealand ...	781	937	520	399	194	125
Other British Possessions.	230	195	256	142	88	28
Total British Empire ...	97,837	90,664	82,263	64,972	62,991	58,676

(*a*) Included in "Foreign Countries" prior to 1915-16.

Exports of Cigars from British India during 1913-14 to 1918-19—*continued.*

Articles and Countries of Final Destination; also share of each Province	Quantity					
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
	1	2	3	4	5	6
Tobacco—*continued*	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Manufactured—*continued*						
Cigars—*continued*						
Denmark	1,262	915	...	...	...	...
Germany	9,506	619	...	...	...	...
France	...	2,272	...	1,449	...	...
Spain	3,554	4,622	556	...	...	...
Turkey, European (including Grete or Candia)	30,663	4,825	...	...	...	...
Turkey, Asiatic—						
Levant and Black Sea	8,135	1,460	...	...	...	...
Persian Gulf ...	...	1,698	4,445	17,528	29,839	21,980
Persia	90	213	150	822	180	1,077
Siam	14,584	5,322	15,662	6,025	11,701	18,424
China (exclusive of Hong-kong and Macao) ...	619	1,592	1,104	255	667	490
Egypt *(b)*	4,890	4,397	...	...	...	...
Sumatra	15	...	...	75	108	3,012
Java	207	40	10	136	15	1,756
Other Foreign Countries.	3,274	220	1,017	1,159	2,276	1,007
Total Foreign Countries.	76,799	28,195	22,944	27,449	44,786	47,746
Share of Bengal ...	11,497	4,065	6,047	3,933	880	435
,, Bombay ...	4,570	5,943	15,123	35,862	51,000	39,976
,, Sind ...	185	25	278	1,909	2,340	4,304
,, Madras ...	988,668	887,165	748,908	466,346	247,274	162,584
,, Burma ...	820,715	836,761	787,379	627,431	702,870	663,145
Total ...	1,825,635	1,733,959	1,557,735	1,135,481	1,004,364	870,644

(b) Included in "British Possessions" from 1915—16.

Exports of Cigars from British India during 1913-14 to 1918-19—*contd.*

Articles and Countries of Final Destination: also share of each Province	Value					
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
	7	8	9	10	11	12
Tobacco— Manufactured— Cigars—	£	£	£	£	£	£
Denmark	130	100	...	...	...	...
Germany	516	47	...	...	...	...
France	...	271	...	107	...	...
Spain	166	225	67	...	...	...
Turkey, European (including Crete or Candia)	1,890	315	...	...	...	...
Turkey, Asiatic ...						
Levant and Black Sea ...	527	67	...	...	...	...
Persian Gulf ...	...	86	441	1,631	3,659	2,461
Persia	9	24	23	139	7	180
Siam	510	261	696	271	697	1,225
China (exclusive of Hong-kong and Macao) ...	51	170	65	20	46	33
Egypt *(b)*	497	447	...	...	...	...
Sumatra	1	...	...	5	5	507
Java	15	3	1	32	2	253
Other Foreign Countries.	286	6	72	68	120	53
Total Foreign Countries.	4,598	2,022	1,365	2,293	4,536	4,712
Share of Bengal ...	1,034	413	512	323	97	24
,, Bombay ...	371	467	1,327	3,125	6,207	4,827
,, Sind ...	30	4	18	200	212	398
,, Madras ...	39,399	31,762	28,358	20,703	9,097	8,600
,, Burma ...	61,601	60,040	53,413	42,914	51,914	49,539
Total ...	102,435	92,686	83,628	67,265	67,527	63,388

(*b*) Included in "British Possessions" from 1915-16.

CIGARETTES.

During recent years there has been a conspicuous increase in the number of cigarette factories in India. The cigarettes turned out are mostly for local consumption, but there is also an important export trade.

Prior to the war, Zanzibar and Pemba and German East Africa were the chief customers of Indian cigarettes. The effect of the war was to divert the bulk of the exports to the Persian Gulf which absorbed 138,390 lbs. out of 169,817 lbs. exported from India in 1918-19 against *nil* in 1913-14. Persia, Bahrein Islands and Zanzibar and Pemba are the other chief customers of India at present, in order of importance. The statement on page 6 gives the export figures for the last six years :—

Exports of Cigarettes from British India during the years 1913-14 to 1918-19.

Articles and Countries *of Final Destination:* also share of each Province.	Quantity					
	1913-14	*1914-15*	*1915-16*	*1916-17*	*1917-18*	*1918-19*
1	2	3	4	5	6	7
Tobacco—Manufactured—Cigarettes—	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
United Kingdom	10	33	2,120	...	...	...
Aden and Dependencies ...	184	...	740	86	1,801	284
Bahrein Islands	601	879	1,158	9,150	6,522	6,950
Ceylon	1,483	1,227	501	532	165	157
Straits Settlements (including Labuan)	121	2,727	1,017	285	54	580
Zanzibar and Pemba	8,666	7,505	7,564	6,733	2,371	5,668
East African Protectorate ...	968	166	1,781	14,717	3,644	4,033
Other British Possessions ...	...	...	407	...	343	35
Total British Empire ...	12,033	12,537	15,288	31,503	14,900	17,707
Turkey, Asiatic—						
Red Sea	...	...	...	400	...	...
Persian Gulf	...	20,507	39,254	269,929	261,993	138,390
Maskat Territory and Trucial Oman.	1,322	1,701	483	1,689	362	3,303
Other Native States in Arabia ...	45	...	...	1,378	2,726	325
Persia	2,137	2,255	616	4,994	19,372	9,714
German East Africa	2,846	730	...	...	403	336
Other Foreign Countries ...	676	434	155	20	18	42
Total Foreign Countries ...	7,026	25,627	40,508	278,410	280,874	152,110
Share of Bengal	832	2,890	3,163	10,018	...	40
,, Bombay	13,943	16,733	51,123	203,856	187,870	91,499
,, Sind	3,983	17,682	1,450	96,027	113,874	78,121
,, Madras	196	800	30	...	...	157
,, Burma	105	59	30	12	30	...
Total ...	19,059	38,164	55,796	309,913	301,774	199,817

Exports of Cigarettes from British India during the year 1913-14 to 1918-19.

Articles, and Countries of Final Destination: also share of each Province	Value					
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
	8	9	10	11	12	13
Tobacco—						
Manufactured—						
Cigarettes—	£	£	£	£	£	£
United Kingdom	1	5	117	...	...	...
Aden and Dependencies ...	4	...	23	7	156	47
Bahrein Islands	30	59	71	664	568	538
Ceylon	116	88	61	261	19	21
Straits Settlements (including Labuan)	17	180	45	30	7	49
Zanzibar and Pemba	470	540	551	459	248	641
East African Protectorate ...	47	13	59	367	200	214
Other British Possessions ...	...	...	26	...	26	27
Total British Empire ...	685	885	953	1,788	1,284	1,537
Turkey, Asiatic—						
Red Sea	...	...	...	33	...	...
Persian Gulf	...	1,598	2,349	23,170	25,018	12,351
Masket Territory and Trucial Oman.	55	122	10	114	43	305
Other Native States in Arabia ...	1	..	...	57	170	60
Persia	95	124	36	474	1,448	1,515
German East Africa	163	40	...	...	44	50
Other Foreign Countries ...	35	24	29	1	1	12
Total Foreign Countries ...	349	1,908	2,424	23,849	26,724	14,293
Share of Bengal	46	183	183	193	...	2
,, Bombay	790	1,314	3,074	16,982	20,257	9,697
,, Sind	172	1,241	114	8,461	7,748	6,029
,, Madras	11	46	1	...	...	42
,, Burma	15	9	5	1	3	...
Total ...	1,034	2,793	3.377	25,637	28,008	15,830

Other Manufactures.

With regard to manufactures of tobacco (other than cigars and cigarettes) Maldives and Straits Settlements were India's chief pre-war customers. Both still retain their places, but a considerable portion of the exports is now sent to the Persian Gulf and Siam while the pre-war exports to these destinations were practically *nil.* Exports to Ceylon also show a considerable increase. The statement on the next page gives the exports figures for the last six years:—

Exports of tobacco—manufactured—other sorts—from British during 1913-14 to 1918-19.

Articles, and Countries of Final Destination: also share of each Province	Quantity					
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
1	2	3	4	5	6	7
Tobacco—Manufactured—	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Other stores—						
United kingdom	...	210	70,336	39,375	...	...
Aden and Dependencies ...	18,558	5,457	8,925	4,652	41,143	2,880
Bahrein Islands	24,890	329	5,068	14,029	6,132	16,572
Maldives	134,064	20,416	234,584	168,075	104,034	86,360
Ceylon	26,083	22,104	43,596	50,791	63,585	47,073
Straits Settlements (including Labuan)	88,847	129,017	64,998	35,844	42,354	121,049
Hongkong	15,885	16,834	9,955	1,883	1,320	574
East African Protectorate ...	1,138	...	411	294	...	1,670
Fiji Islands	55	140	295	2,627	...	...
Other British Possessions ...	2,967	1,824	974	287	1,751	776
Total British Empire ...	412,487	382,331	439,142	318,157	260,319	276,954
Turkey, Asiatic—						
Red Sea	...	...	477	11,616	1,092	14,473
Persian Gulf	489	2,424	24,368	52,174	12,452	53,929
Maskat Territory and Trucial Oman.	29,550	32,528	8,681	26,431	21,849	21,399
Other Native States in Arabia ...	16,623	...	5,019	7,581	...	15
Java	943	985	1,676	6,990	6,124	11,820
Siam	...	...	205	168	10,900	52,380
Japan	...	...	...	...	...	5,128
Other Foreign Countries ...	1,222	1,089	1,710	1,648	1,333	594
Total Foreign Countries ...	48,827	37,026	42,036	106,608	53,740	159,638
Share of Bengal	335,730	357,999	419,891	283,027	167,264	150,707
,, Bombay	1,835	2,811	30,097	78,647	61,877	62,209
,, Sind	6,402	8,535	7,910	15,073	21,622	24,339
,, Madras	9,167	8,085	15,927	47,868	60,676	43,515
,, Burma	8,180	41,927	7,353	150	2,620	155,802
Total ...	361,314	419,357	481,178	424,765	315,059	436,592

Articles and Countries of Final Destination; also share of each Province	Value					
	1913-14	1914-15	1915-16	1916-17	1917-18	1918-19
	8	9	10	11	12	13
Tobacco— Manufactured—	£	£	£	£	£	£
Other stores— United Kingdom	...	8	441	202	...	...
Aden and Dependencies ...	151	39	57	32	667	47
Bahrein Islands	456	11	68	179	161	163
Maldives	813	1,265	1,394	1,010	850	729
Ceylon	218	420	854	1,815	2,738	2,645
Straits Settlements (including Labuan)	1,614	2,455	1,304	557	608	3,822
Hongkong	116	111	69	12	10	5
East African Protectorate ...	22	...	2	4	...	108
Fiji islands	2	12	23	169	...	...
Other British Possessions ...	105	58	34	13	33	34
Total British Empire ...	3,497	4,379	4,246	3,993	5,067	7,553
Turkey, Asiatic—						
Red Sea	...	...	7	226	30	692
Persian Gulf	21	115	394	1,883	612	2,727
Maskat Territory and Trucial Oman.	568	64	296	800	1,037	653
Other Native States in Arabia ...	157	...	120	127	...	1
Java	25	40	29	187	164	490
Siam	...	...	3	2	359	1,685
Japan	...	...	...	...	...	160
Other Foreign Countries ...	18	46	52	43	47	28
Total Foreign Countries ...	789	844	901	3,268	2,249	6,436
Share of Bengal	3,399	3,070	3,317	2,264	1,844	1,854
" Bombay	35	128	516	2,386	1,630	2,726
" Sind	270	370	337	620	920	1,465
" Madras	324	343	738	1,988	2,837	2,713
" Burma	258	1,312	239	3	85	5,231
Total ...	4,286	5,223	5,147	7,261	7,316	13,989

Future Prospects.

Repeated efforts have been made in India for many years to improve the quality of the produce; these efforts have met with some success and the quality has improved. The Agricultural Research Institute at Pusa has been and is conducting elaborate research work with a view to further improving the quality of the Indian tobacco. A pure line selection, which is suitable both for cigarette purposes and also for general cultivation, continues to increase in popularity among tobacco growers. Definite schemes of seed distribution have now developed in North Bihar, in Burma and in the Central Circle of the United Provinces. In Bombay, as a result of attempts to introduce exotics, a superior hybrid variety has been produced which ousted the local variety. The distribution of Havana seen by the Agricultural Department has led to the establishment of a superior variety of tobacco in Lower Burma and in Arakan. Steps have also been taken in the direction of introducing new varieties of tobacco plants into other parts of India.

The one-sixth preference accorded by the United Kingdom Tariff to Empire-grown tobacco and manufactures thereof, which works out at slightly more than 1s. per lb. of unmanufactured tobacco and at about 2s. 6*d.* per lb. of cigars, should serve as a stimulus to the already expanding Indian export trade, since a large quantity of tobacco (both leaf and manufactures) is annually exported to the United Kingdom, the exports in 1918-19 amounting to 2,968,521 lbs. valued at £44,517.

With the conclusion of peace and the prospects of return to normal conditions of freight and shipping the prospects of the trade seem to be bright.

CO-OPERATION IN MADRAS, 1917-18.

By "Viator."

Mr. Hemingway's Report on the working of his Department in Madras during 1917-18 is refreshing reading after some of the Reports recently commented on in these columns. As the Local Government say in their review, it is a record of continued progress in all directions. The extent of this progress can best be illustrated by a few statistics. The number of societies increased by nearly 23 per cent, their membership by 17.1 per cent and their working capital by 14.6 per cent. The reserve funds showed an increase of about 23 per cent and the net profits one of 67.6 per cent. The total deposits attracted by the societies amounted to 95¼ lakhs of rupees against 85½ lakhs in the previous year.

Even more important, in our opinion, as a gauge of true progress is the state of the collections. The co-operative movement cannot be regarded as being in a thoroughly sound state if arrears are allowed to pile up. We will not inflict any more figures on our readers especially as the numerous tabular statements which Mr. Hemingway gives are not at all easy to follow. It is sufficient for present purposes to note that there was an all round improvement in the collection both of principal and interest in the case of central banks and agricultural societies and some falling off in that of non-agricultural societies. Whilst this is distinctly satisfactory as compared with the rapidly increasing arrears in some other Provinces, Mr. Hemingway admits that the arrears due to agricultural societies are far larger than they should be. He points out, however, that the figures are hardly a fair index to the condition of the average society as they are unduly swelled by the few really bad societies,

In Ganjam, for instance, one society contributed 25 per cent of the arrears to the district total. In the Southern districts of the Madura Section, there are a number of old societies which got into a thoroughly bad state some years ago whilst in the Kistna District, the societies near the Kolair lake have been persistently unfortunate. *Prima facie*, there would seem no justification for allowing these bad societies to continue to exist.

Another test of the soundness of agricultural societies is the proportion of their loans which is granted for productive purposes. This is steadily increasing in Madras and, in 1917-18, amounted to 68 per cent, 30 per cent being granted for redemption of prior debts and the insignificant remainder of 2 per cent for non-productive purposes. Mr. Hemingway considers that long term loans are too readily given, especially in the tamil country, and mentions cases in which loans have been given as a matter of course for ten years. He rightly points out that this is demoralising to the borrower and tends to restrict the credit both of the society and of the member, thus preventing the financing of ordinary agricultural operations.

It is possible that, in the future, agricultural societies for purposes other than credit will play an even greater part in the development of Indian agriculture than the credit societies but at present, their promise considerably exceeds their performance. Societies for joint purchase are making considerable progress in Madras as regards numbers but the total amount of their transactions is still very small. The dealings of the seventeen societies whose activities are entirely confined to joint purchase amounted to Rs. 8,145 only whilst those of credit societies and local unions which added this to their ordinary business amounted to almost half as much again. The articles purchased were chiefly agricultural implements, seed and manure but the credit societies also purchased some household requirements. The method followed by these societies was for the panchayet to secure indents from the members of the amount of the articles required and then to make a joint purchase to the best of their abilities. The articles were paid for at once either in cash or out of a loan given for the purpose by the society. Joint purchase was not confined to agricultural societies. Four Municipal Employés Societies made purchases of food for their scavenger members periodically. The food was distributed on the spot, the cost being deducted from the wages of the employés at the end of the month. Two municipal societies also made joint purchases of cloth. Co-operative societies are beginning to buy salt direct from Government depôts.

The co-operative sale of agricultural produce in Madras has made much less progress than co-operative purchase. Paddy and chillies were sold in a few cases to the benefit of the members of the societies which did so. Madras has yet to follow the lead of Bombay in establishing cotton sale societies. The activities of the seed Unions in the Tinnevelly tract are not mentioned, presumably because they are not registered co-operative societies. These Unions which consist of five or six ryots undertake to sow the whole of their cotton area with selected seed supplied by the Agricultural Department, to gin the cotton and sell the lint jointly under the supervision of the Department and to keep the seed for sale in the following season. The spirit of the Unions is, therefore, truly co-operative even though they are not formally enrolled.

Madras possesses one co-operative manufactory. The Nidamangalam society in the Tanjore District makes bone meal manure and bone phosphate which it sells to its members far below the market rate. The total value of the manure was only Rs. 685 but it is satisfactory that even this small beginning should have been made.

As in other Provinces, notably Bengal, the Madras Co-operative Department is making special efforts to help the weavers, who have been very badly hit of late by the rise in the price of yarn which has been much greater than that in the price of the finished product. The most interesting of the new weavers' societies started during the year was that at Berhampur where the rise in the price of yarn had thrown so many men out of work that there had been considerable emigration to Calcutta. Of the share capital of Rs. 3,000, Rs. 1,500 was subscribed by the Sub-Collector, Mr. R. W. Davies and the District Judge, Mr. B. C. Smith. The difficulties of the society were, however, only beginning when the necessary capital was raised. It was found impossible to get cheap yarn and improvement in the condition of the weavers could, therefore, only be brought about by better marketing arrangements for their cloth. Fortunately, Sir Gordon Fraser of Messrs. Best and Co. came to the rescue and that firm agreed to supply yarn at cost price and to sell the cloth at a small commission, undertaking all risk of loss. Whilst the generosity and public spirit of the three gentlemen mentioned deserves the highest praise, we feel constrained to point out that this is philanthropy not co-operation. We cannot but think that, if weavers' societies are to be established on a really sound basis and if there is to be the development of similar activities in other parts of the country to which Mr. Hemingway looks forward, there must be less dependence on charity and more on the working out of a business arrangement. If weavers' societies cannot subsist without as large a measure of philanthropic assistance as has been received by the Berhampur Society, it is well that the fact should be frankly recognized, regrettable as it would be, and efforts mad to find some other solution of the problem presented by decaying cottage industries. The old Conjeeveram Urban Weavers' Union worked at a profit of Rs. 1,000, apparently without extraneous aid and we hope that it will not be long before the Berhampur Society is able to do likewise. In Bengal, the weavers' societies are grouped together in a Union at head-quarters. Each society purchases shares in the Union with its own share capital but takes no financial responsibility beyond this. The Union arranges to purchase yarn at wholesale rates and to dispose of cloth which the societies are unable to sell. Some such arrangement should be feasible in Madras. The object of co-operation, after all, is to enable weavers and others to stand on their own feet.

As to other forms of non-agricultural co-operation, most of the building societies, now ten in number, did good work. One interesting society is the Sadananda Printing Society in South Canara which undertakes the printing work for all the primary societies in the South Canara District and supplies them with account books and forms. It worked at a small loss which should be easily converted into a profit, if all the societies in the district join it as they should do. The Madras Co-operative Department has always paid special attention to work amongst the backward classes and there are now 160 societies of which over one-third of the members are Panchamas, the membership of 43 of them being confined exclusively to that class. Amongst these societies are several for municipal employés and it is pleasant to read that many of them are admirably managed and that the Chairman and superior officers of the municipalities concerned take a real interest in them. The co-operative work which is being done by the Secretaries of the Young Men's Christian Association among Christians and Panchamas and by the Fisheries Department amongst the fishermen of the West Coast deserves special mention. It is also worthy of notice that the backward agency tracts in the Northern Circars are being opened up by the Co-operative Department and that the remarkable straightforwardness and honesty of their

unsophisticated inhabitants renders them a specially promising field for the operations of the Department as it has, unfortunately, in the past for exploitation by unscrupulous dealers and sowcars.

The Report is not quite so clear as it might be on the important question of supervision. It states that, at the end of the year, there were only 209 primary societies which were not enjoying Union supervision of some sort or other. It would appear that this supervision is still exercised, in many cases, by Central Banks who are, however, gradually divesting themselves of it and handing it over to local Unions of which eighteen new ones were registered during the year. Mr. Hemingway writes very hopefully of the local Union both as a means of supervision and as a form of co-operative education. He considers the work of a really good local Union of the most encouraging pictures that he has seen of the rural life of the Presidency.

Other satisfactory features of the year's working were the great fall in the number of suits filed, due to the fact that the arbitration rule was freely used, and the closer co-operation between the Co-operative and Agricultural Departments. The two Departments now hold an annual conference and are drawing up a joint programme of development work. This is a most encouraging sign of the times. Both Departments are fortunate in possessing enthusiastic Directors and the combination of their forces makes the outlook in Madras especially hopeful.

SOME ASPECTS OF TANGADI REVENUE, 1919-21.

By N. Sampathiengar.

TANGADI bark, which is the most important vegetable tanning material, is growing more and more in importance as a commercial produce and this fact has manifested itself in the increasing revenue to Government under this head year by year. The figures reached during the recent auction sales are said to be record ones, and it is the purpose of this note to see whether we have reached the topmost level or whether we are still to attain it.

In the year 1914-15, the price of the bark was Rs. 25 to Rs. 30 per *baram* of 680 lbs. This gradually rose to Rs. 35, and the prevailing rate in the first quarter of 1916-17 was Rs. 40. Since then the competition of the skin tanners, who, dealing in an article of luxury, could look for profits ranging from 200 to 400 per cent and, therefore, afford to pay for the bark upto Rs. 100 per *baram*, was so keen that the rate for the bark rose to Rs. 82—8—0 in the beginning of the second quarter of 1917-18. Just then the Government of India required from the tanneries in South India 8,000 bales of 60 tanned hides each per month, while the normal outturn was only 2,000 bales. This was a serious question and the matter was, therefore, considered deeply from all its aspects. The first solution arrived at was the prohibition of skin tanning to induce every tanner to take up to hide tanning. Since the Government was the purchaser of the entire stock of the tanned hides, it was in their interest to see that the prices were kept down as low as possible. This they could not do as long as the high prices for the bark prevailed. The Government control over the bark trade was thus necessitated prohibiting all private dealings in the stuff and directing that the entire quantity of bark collected by the contractors should be sold to Government at the prices fixed by them.

In co-operation with the Imperial Government, the Government of His Highness the Maharaja of Mysore brought the bark trade in Mysore under their control. The previous years' auction sales had brought in a high revenue to Government and it was, therefore, considered that, if large remissions were not made to the contractors, they would sustain heavy losses on account of the low rates fixed by Government. It was with this object that the Government of His Highness the Maharaja of Mysore ordered heavy remissions to be made by which, it is understood, the Government have sacrificed a revenue of about Rs. 5,06,000. From statement No. II, it will be seen that, in spite of the fall in the quantity of bark supplied during the period of control by 50 per cent and in the value by 59 per cent, the contractors have still made a profit of about Rs. 1,26,000. If the supply of the bark had been upto the normal quantity, the contractors would have made a further profit of Rs. 3,74,000 and their total profit would have thus worked out to Rs. 5,00,000 and made the remissions unnecessary. Since the contract areas were confirmed on the previous years' contractors who had the best of the advantages of the very high prices for the bark before the control, it was not expected of them to make any profit in the concern, and the concession granted to them to consign their bark to the Government Depôts "Carriage Forward" was quite sufficient to induce them to work out the areas satisfactorily. Further the confirmation of the areas in the name of the previous years' contractors was the greatest concession shown to them, as otherwise they would not have been able to recover the heavy advances they had made to their *shikmies*.

It has been thought by many that the bids in the recent auction sales were made by contractors who made no calculations at all as to the future of the market. This might have been so in the case of one or two taluks, but the fact of a universal increase should necessarily dispel this idea. The contractors have rightly thought that, when the restrictions on the bark trade are removed and the markets are rendered free, the high pre-war rates would prevail and help them to make profits.

In statement No. I an endeavour is made to show that there is every scope for Government to realise still Rs. 3,40,000 more revenue under the existing conditions alone. The pre-control rates, as stated above, were upto Rs. 82-8, and were showing a tendency to rise when the restrictions were imposed upon skin tanning. And now for the purposes of the present calculation, an average rate of Rs. 65 per *baram* is taken, leaving a fair margin for all market fluctuations. Ample provision is made for collection and other charges including unforeseen losses due to irrecoverable advances. Profit to the contractors is not ignored and a provision for a profit of 20 per cent is made and this seems to be more than reasonable.

With the help of the *Review of the Foreign Rail-borne Trade of the Mysore State* for the year 1917-18, published by the Department of Industries and Commerce, the annexed statement No. I is prepared. From this statement it is worked out that our forests, under the existing conditions alone, are capable of yielding 90,400 *barams* of bark during the contract period of two years. This statement is certainly open to revision as only an approximate figure has been adopted to represent the export by road to the adjoining British territories. Further not less than half the produce of the Monakalmuru taluk is received in Bangalore by rail from stations situated outside the State. This quantity is recorded in the Trade Statistics as the import into the State and has been deducted now from the export to find out the net export. In the absence of any correct information as to the quantity of bark that this taluk yields, it is not possible to rectify this defect.

While the improvements for increasing the output of bark in the State are being effected, it is in no less degree important that the progress made in this direction should be closely watched. This can be done satisfactorily by preparing and recording correct statistics of yield of each area in a systematic manner year after year.

At the outset it may be said that the Trade Statistics published by the Department of Industries and Commerce would serve the purposes of the Forest Department. But it is open to question whether statements prepared for the purposes of general trade statistics would amply serve for calculating the yield of revenue to Government. It should also be remembered that it is not possible from this record to go into minute details for finding out the yield capacity of each contract area. Moreover, these statements, as stated in para 6, include under the imports even the local produce to some extent. It is, therefore, necessary for the Forest Department to have its independent statistics prepared year after year and base its calculations of revenue on this. Just now the new contract period has commenced and the Forest Department should lose no time in beginning its work in this important direction.

In this report no special account of *Kakke* Bark is taken, as there is absolutely no independent information available regarding the same. Moreover, the attention paid towards the collection of this produce has been little and as long as *tangadi* bark commands a high market rate, no contractor will care to trouble himself with.

The next thing to discuss is whether the quantity of bark extracted represents the maximum yield capacity and whether it is consistent with the permanent supply. A careful review of statement No. I will disclose the fact that the produce extracted in any year is not really the yield capacity of our forests and that the extract of bark is entirely dependent on the market rate procurable for the same. In the year 1913-14, the yield is shown to be 28,559 *barams* which has gone upto 53,585 *barams* in 1916-17, which is an increase by 88 per cent. When no improvements are effected on the growing side, the only rational explanation is that the extraction is dependent upon the market rate for the stuff. If it was not for the fall in the rate for the bark from the middle of the second quarter of 1917-18, from Rs. 82-8 to Rs. 55, on account of the prohibition of the skin tanning, the collection work would have been carried on with continued activity and the total yield for that year would not have worked out to be less than that of 1916-17. It is, therefore, certain that our forests are capable of yielding more bark than the quantity that has been worked out in statement No. I.

In finding out the yield capacity of our forests, one important item has all along been ignored, and that is the extent to which the quantity of bark collected in the private holdings contribute to make up the worked out quantity. In the absence of any definite information on the point, it is useless to take any cognizance of it at all.

In the terms of the agreement executed by the contractors certain conditions are laid down regarding the maintanance and submission of accounts relating to the collection and removal of bark by the contractors on one side and constant inspection of such accounts by a competent authority of the Forest Department on the other. If these conditions are strictly enforced, several of the problems enumerated above can be solved easily.

To maintain, year after year, the revenue under the bark at an almost constant figure, it is very necessary to prevent inroads on the standing immature growths by the contractors. The cutting of immature plants not only leads to deterioration in the quality of the bark but also jeopardizes the future. It is,

therefore, essential to arrange for frequent inspections of the stocks of barks with the contractors.

The quarrels between the Government contractors and the contractors of private holdings are also growing in volume. These quarrels are the greatest impediments in the way of the speedy collection of the bark, especially by Government contractors. By experience gained during the time of the control, it is learnt that such quarrels are mainly due to false estimates of the yield made by inexperienced persons who, in some way or other, are known to be interested in the applicants, and on whose recommendations licenses are blindly issued. This is a subject in itself and requires a very careful handling as it involves the question of private rights.

The local officers of the Forest Department themselves will, in future, issue passes to the contractors under the Transit Rules and it is now open to question whether it is desirable to allow counter-checking also to form part of their duty and whether it will not be better to have it done directly by the Central Office.

This note is prepared with a view to elucidating the existing defects which arise mainly from not recording the information connected with bark exploitation in the State in the form in which it is required to be done. It is hoped that the Forest Department will in future take special care with regard to such a commercially important produce as tanning bark, and will arrange for regular statistics of yield, etc., to be prepared year after year so that the revenue under the bark may not be allowed to go down.

Statement No. I.

Bark Account	1913-14	1914-15	1915-16	1916-17	1917-18
Export in Ry. Mds.	168,000	142,994	187,740	252,864	187,347
Import do	42,300	30,272	33,744	24,377	37,858
Net export do	125,700	112,722	153,996	228,487	149,489
do in lbs.	10.307,400	9,243,204	12,627,672	18,735,934	12,258,098
Tanned Hides Account :—					
Export in Ry. Mds. ... ... or	45,000	67,601	81,835	87,418	80,647
No. of hides exported	405,000	608,409	736,515	786,762	725,823
Bark consumed in tanning the above in pounds	9,112,500	13,689,202	16,571,588	17,702,145	16,331,018
Add net export in pounds ...	10,307,400	9,243,204	12,627,672	18,735,934	12,258,098
Approximate yield in lbs.— ... or	19,419,900	22,932,406	29,199,260	36,438,079	28,589,116
In barams of 680 lbs.	28,559	33,724	42,940	53,585	42,043

Average yield per year is 27,315,572 lbs. or	40,170	barams.
Add approximate quantity exported by road	5,030	,,
Total yield per year ...	45,200	,,

or

Yield for two years, which is the contract period, is		90,400	barams
Value that can be realised at on average rate of Rs. 65 per baram Rs. ...		58,76,000	
Deduct :—(1) Cost of collection and interest on capital at Rs. 25 per baram and loss due to irrecoverable advance at Rs. 5 = at Rs. 30 per baram	Rs. 27,12,000	46,12,000	
(2) Government dues	,, 19,00,000		
Net gain to the contractor ... ... Rs.		12,64,000	

or 27 per cent on the capital outlay

Since ample provision is made for collection charges, interest on capital and loss due to irrecoverable advances a profit of about 20 per cent is more than reasonable.

The excess profit which will be about Rs. 3,40,000, which should go to increase the Govt. Revenue.

State No. II.

Supply of bark during the period of Control :—

(1) For local tanneries	25,345	candies of 500 lbs. each.
(2) ,, export	6,848	,,
Total ...	32,190	
Deduct import from outside the State ...	1,880	
Local Produce	30,310	candies or 22,287 barams

Value realised by the contractors at Rs. 34 per candy		Rs. 10,30,540
Deduct :—(1) Cost of collection, etc., at Rs. 30 per baram or Rs. 22 per candy	Rs. 6,69,820	Rs. 9,04,820
(2) Government dues	Rs. 2,38,000	
Net gain to the contractor		Rs. 1,25,720

or nearly 14 per cent

ECONOMICS IN THE WEST.

The British Industry.

London, 21st August, 1919.—Economically and industrially we are still in the doldrums. With a government expenditure which exceeds four million pounds a day it could hardly be otherwise. The country's enterprise is paralysed by this dead weight of outgoings for which there is no adequate return. The direct effects of such extravagant expenditure are obvious. Money is made dear for the manufacturer by the government demands upon the money market, trade is disorganized by the fact that the government on the one hand competes for labour and pays extravagant prices for it, and on the other expends lavishly in the distribution of doles to unemployed who with government money in their pocket are under no necessity to work. But the indirect consequence of the existing financial recklessness are even more serious. Prominent amongst them is to be reckoned the industrial unrest which disturbs the country. The working classes simply cannot realise that there is the most urgent need for all to work at high pressure and reduce the appalling load of debt while money is being squandered right and left on objects many of which ars transparently futile. Government extravagance, too, has its share in producing the high prices of the necessaries of life which are only a grave source of discontent. In fact, we are in a completely vicious circle and there must remain until a drastic check has been applied to the tendency of almost all government departments to spend money on a war scale.

Happily there are signs that a new era is being entered upon. The government at last have awakened to the danger which threatens the country and incidentally menaces their own existence in the reckless financial methods which are being pursued. We are promised by the Premier a thoroughgoing overhaul of the entire official system and the presentation of revised estimates more in accordance with the nation's capacity than those recently presented to Parliament. Whether even Mr. Lloyd George with all his dynamic energy will be able to exorcise the fiend of extravagance which has so long dominated our public departments is, however, a question upon which there is some doubt. He has to reckon with private interests which are strongly entrenched in the government and his own policy is one which does not lend itself to economy. However, we may hope for the best now that public opinion is thoroughly aroused and people of all classes are alive to the gravity of the issue which retrenchment presents. Meanwhile, it is satisfactory to note that the industrial ferment has conspicuously died down. The stand made by the London police against the revolutionary movement which sought to use them for Bolshevist ends has had a splendid moral effect throughout the country. The defect of the Yorkshire miners has contributed to the restoration of healthy conditions. The nation is manifestly rich of social strife and is turning surely to the patriotic position that the State's needs are paramount and must be pursued irrespective of the interested clamour of any section however powerful it may be. In this connection may be mentioned the significant action of a powerful body of northern engineers who a few days ago met at Manchester and decided to postpone all demands for increases of pay in view of the urgent necessity of increasing the production of manufactures to restore the national credit.

There can be no doubt that the better elements amongst the working classes are at last awake to the peril of the industrial situation arising out of the excessive cost of production. Foreign competition, and especially American competition is very keen in lines which were once markedly British.

Prices are being quoted even in the home market for goods against which the British manufacturer cannot compete. Especially severe is the fight in the steel and tin plate trade. There was a case the other day in which a question was given for steel rails by an American firm which was £ 2 per ton below that of the lowest English tender. If this happens in the green tree what will be the position in the dry? It at the moment when the full effect of the coal trouble has not been realised the transatlantic manufacturer can undersell to this extent in the United Kingdom what may he not do later on when the inevitable results of mining syndicalism are reaped? Well, indeed, may the thoughtful workman pause before he lends any further support to the subversive policy of the extremists. He is not unfamiliar with the old adage about the goose and the golden eggs. He has no desire to emulate the Russian Bolshevist and strangle industry for an idea. He wants to live and desires that his country shall not lose its reputation as the great home of successful manufacturing industry. Hence we find a wholesome revolusion in working class circles in favour of the adoption of methods leading to increased production and the general stability of industry.

It has not been overlooked here that one of the favouring factors for the recovery of British industry is the rise in the sterling exchange value of the rupee. Obviously with an increase of sixpence in the conventional figure a great incentive is offered to the purchase of British goods by India. The amount will act as a sort of bounty and stimulate all classes of exports and notably those which are in most popular demand such as cotton piecegoods. But of course the influence of high exchange must not be exaggerated. There has been a tremendous increase in the cost of production on this side and the rise in the value of the rupee will be an inadequate set off to it. We have, moreover, to bear in mind the unsettling effect that a fluctuating exchange has on trade. Traders are chary of buying when they do not know from one day to another what the standard of value actually is. Probably in the long run it will be found that the consequences to infant Indian industries are not so serious as the Bengal Chamber of Commerce has anticipated. At all events where India has consolidated her industrial position as in the steel trade she has little to apprehend from the effects of dear silver. The demands of the world are so enormous and the upward trend of wages in Europe and America is so marked and persistent that she should be able to more than hold her own in spite of exchange.

A UNIVERSAL LANGUAGE.

In the evidence given before the Committee now sitting here on the subject of Indian Government I noted the other day a declaration in favour of an all India language other than English. The witness appeared to favour Hindustanee, though from the only report of his evidence that I was able to obtain it was not made very clear that he had any strong preference for that form of speech. How far his views may be supported in India I have no means of knowing, but it seems to me that it would be a fatal step at this stage of India's development to depose English from the position it at present occupies as the recognised medium of general speech throughout the Indian continent. At the present time English is spoken by upwards of 200 million people. It is the one language which will take a trader with the greatest facility round the world. Fifty years hence with the growth of America and the English speaking colonies its position will be still more predominant. In fact, if there is ever to be a universal language of Commerce it must be English. What would be the position of India if she cut herself off from the linguistic source to which all the other great trading races of the world were open?

Hindustanee would not help her even if she could plant it in the parts of India where it is almost as much an exotic as English. Outside her own borders it would have less value commercially than Esperanto. I say nothing of the effect that the dethronement of English would have on education, especially technical training. The point I wish to emphasise is that if India is ever to be a great industrial nation she simply cannot do without the English language.

FLAX CULTIVATION.

Flax cultivation as an Imperial industry is exhaustively discussed in the report of the Empire Flax Growing Committee which was appointed some little time since. Having pointed out the undesirability of an industry so important as the linen industry is having to rely upon external sources of supply the Committee describe the efforts made by the government under the necessity of abnormal war conditions to foster the revival of flax growing in the United Kingdom and to extend its cultivation within the Empire. At present the cultivation in England and Scotland is of an experimental character and owing to the high cost of labour the doubt is expressed whether it will ever be a real economic success. Ireland is in a different position and it is hoped that there may be a large extension of cultivation in that country. But the most promising new fields are outside the United Kingdom. In Western Canada flax growing has been introduced with a certain measure of success and results already achieved in British East Africa warrant the hope that the development will be maintained and extended. Nothing is said about India, but it is almost certain that in some part of the vast area under British rule flax cultivation might be successfully carried on. The labour difficulty which presents so formidable a bar to the production of flax in Great Britain and to an almost equal degree in the Dominions would not here present itself and there would, it might be imagined, be other advantages. The subject is certainly worth investigation in view of the growing importance of the linen industry and the increasing value of its raw material.

DEVELOPMENT OF RADIO ACTIVITY.

The increasing costliness and scarcity of coal is causing attention to be devoted to the development of alternative sources of power. One of the most instructive contributions to recent literature on this subject is the series of articles which Sir Oliver Lodge is contributing to the *Observer*. Though the concluding contribution has yet to appear it is made plain that the writer entertains strong hopes that in the near future scientific discoveries will be made which will reduce coal to an entirely subordinate position in the industrial world. His chief reliance appears to be placed on the development of radio activity. The precise character of this agent is explained by Sir Oliver Lodge in a few illuminating sentences. "In radio-active substances" he writes, "there is a store of atomic energy and some of the energy is liberated by the emission of flying particles which are flung off from time to time whenever the atom is degenerating or passing from a more complex to a more simple form. And this emission of energy is very great. When it was first observed that a few grains of radium were continuously giving off a great deal of energy and yet not disappearing some scientific men, even Lord Kelvin himself, spoke of it as a marvel or as a sort of miracle. The stuff burned as it were and yet was not consumed. It soon became clear, however, that there was no flaw in the law of conservation of energy. The stuff certainly possessed and certainly loses all the energy it emits but it loses very little weight. The amount of energy it gives off per grain is so prodigious that the loss of weight is imperceptible. "The question is whether this locked up energy of the atom can be utilised. If it can a new era will have dawned upon the world by the side of which the electric age and even the steam age will seem trivial.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

"Dry" Extracts and Perfumes.

Washington, D. C., U. S. A., July 22nd, 1919.—The usefulness of extracts and perfumes for other than their advertised purposes has long been known, but with the advent of new legislation it has been a problem for the chemist to find a way out for the manufacturer. Extracts made in the usual way and then evaporated to dryness after the addition of sugar so that a spoonful of the powder equals a spoonful of the usual fluid, have not found favor with the housewife. Emulsions have been advocated, but these almost without exception separate in a short time. There would seem, however, to be a promising field in this direction for research on the part of some physical chemist.

Where an oil is involved, such as lemon, bakers have found dilution with highly refined vegetable oils satisfactory, and get an excellent distribution of the flavor in their product. Vanilla has caused the most concern, chiefly because the standard tests involve those for resins which only alcohol extracts from the bean. The presence of such resins has been taken as an indication of vanilla from the bean in contrast to synthetic vanillin. Percolations with glycerine or its derivatives give excellent extracts under controlled conditions, but tests for resins cannot be obtained. Obviously, we shall have to change our tests to conform to present conditions.

In work of this type the chemist is rather limited in his choice of solvents, for they should have food value, be absorbed by the alimentary tract, and known to have no ill effect upon the human system. Many solvents which suggest themselves are at once ruled out by these specifications.

In perfumes the restrictions are not so great, solvents with strong odors being those found most unsuited. Organic research continues to give us new solvents, and if we come to the worst we can use undiluted perfumes in small drops in place of the alcohol solution in an atomizer.

FARMING WITHOUT THE AID OF LABORERS.

How large a farm can one able-bodied man, unassisted, plow, cultivate, plant and harvest with a fair degree of efficiency?

Not so very long ago it would have been considered extremely presumptuous for any unaided man to undertake the cultivation of a farm of more than a few acres. Now, however, thanks to the formidable array of labor-saving machines, invented and placed on the market in recent years, it is by no means beyond the range of possibility for an enterprising worker to cultivate from thirty to one hundred acres, according to the kinds of crops he expects to raise.

The power-driven cultivator is one of the recent additions to the labor-saving agricultural machines that have completely revolutionized farming in the United States. The machine may be used as a cultivator, and for drilling, planting and sowing, special attachments quickly adapting it for the particular work that is to be done by it.

This machine is equipped with six rollers for breaking up the clods of earth after plowing. By adding one or more rollers the capacity of the machine may be materially increased. It can also be used for planting three or more rows at a time. With a different attachment the machine can be used for sowing oats or grass, and by still another attachment it can be adapted for drilling the ground or row-planting.

The drive wheels of this versatile agricultural machine are also its steering wheels. The power is supplied by a gasoline engine, and one man can easily run it.

The construction of the machine is simple and substantial. To make the changes for adapting it to the different kinds of work which it is able to perform takes but little

time and does not require the services of an expert machinist.

With a machine of this kind in his possession the farmer is truly independent of the labor market.

WHAT NEXT IN AERIAL NAVAGATION?

The Atlantic has now been spanned by a lighter-than-air craft as well as by airplane, and a new era has been entered so far as aviation is concerned. It is significant that the British, in commenting on their great achievement, made it clear that the R—34 was almost obsolete to-day as a first-class dirigible, and that larger dirigibles were rapidly nearing completion. They pointed out that a reasonable increase in the dimensions of the dirigible increased its lifting power and speed enormously, so that in the very near future we could look forward to dirigibles measuring 1,000 feet and more in length and carrying over 200 tons of cargo.

As for the landing problem of huge dirigibles—and this is being made much of as an argument against them—it is bnt a matter of being properly prepared. Our arrangements to receive the R—34 at Roosevelt Field, it is evident, were hurriedly improvised. This was understood. The United States army and navy did not have sufficient notice to prepare suitable housing facilities; but now that long-distance travel by dirigible seems to be so close at hand we can rest assured that suitable and sufficient mooring and housing facilities will soon be provided at various points along the Atlantic and Pacific coasts. And in this connection it may be that suitable mooring towers may prove quite suitable for mooring dirigibles out in the open, making huge sheds necessary only for building and repairing the aerial greyhounds.

In any event, the dirigible has proved its long-distance flight qualities in a big and successful way. Trans-Atlantic flight service is rapidly approaching realization, although much remains to be done by way of making the craft more sturdy, more powerful, and better carriers of men and goods.

INTERESTING SPECIAL DUTIES FOR THE TRUCK.

"Special duty trucks" are more or less of an old story; we are inclined to think that we have seen them for every sort of special duty that could possibly be devised. That such a very broad impression may be erroneous, however, is indicated by at least one truck which has just come into extensive use in the United States.

The stake-driver truck for circus use is certainly a new one. Of course, we all know that the circus, in its travels from town to town, comes in, first and last, for a tremendous lot of stake driving. Then, too, most of us know that of late years the circus has been pretty thoroughly motorized. But nearly every person will be prepared to receive this latest innovation as a novelty.

The stake driver, attached to the rear of the truck, is a miniatnre pile driver, with hammer and derrick for driving and pulling stakes. The power for driving the stakes is supplied by a small horizontal gas engine distinct from the power plant of the truck. This, it will be seen, is an economy. There is no sense in using the big, powerful truck engine for this comparatively light work. It would be altogether too mnch like driving carpet tacks with a sledge hammer. The truck, in addition to carrying the stake driving mechanism, is used for the heaviest kind of tractive work. In the daily "trek" to the next town or stopping place it will haul two large, husky trailers, and it has a large ring on the front for the purpose of pulling loads on the reverse.

Another interesting development of the special duty truck is the refrigerator truck for hauling meat or other perishable foods. For instance, it requires two and one-half days to make a carload shipment of fresh meat from the city of Detroit to the city of Toledo by rail. With the truck, a Detroit packing house makes the trip with nine tons

of meat in less than six hours. It will, of course, be realized that the economy is not merely an operating one, but consists equally in getting the meat to its destination in better and more wholesome condition.

The body of this refrigerator truck is designed much like the standard refrigerator car. The ice tanks are filled from the top. To make the service pay the maximum return, it carries general merchandise or other goods on its return trip from one city to the other.

Leather Belt by a New Process.

An extremely interesting invention has just been made here, which is based upon the somewhat astounding maxim or theory that the more a hide is tanned the less resistant does it become. In support of this statement mention is made of the numerous pieces of leather found in ancient Egyptian stables, etc., which have successfully resisted thousands of years' exposure to the attacks of destructive agents of all kinds. Now, all of this leather goods were made of parchmented leather. In modern times samples of this class of leather may be cited in the cases of the lashes of bunting crops, the hinges of flails, etc.

The inventor, having studied the enormous resistance of parchmented leather to traction, proposed to apply this quality to driving belts; but to effect this, as parchmented leather has no elasticity, it was necessary to find a process obviating this difficulty.

The solution of the problem, as it has been worked out, is both elegant and ingenious. It consists of combining in the leather itself both the qualities of vegetable-tanned leather with those of parchmented leather. By means of considerable pressure there is indelibly impressed in the hide a pattern resembling the metal trellis-work used to form fences and for other purposes. At the point where the pressure has been used the hide becomes absolutely indifferent to any tanning material whatsoever.

This result obtained, the hide is tanned and only those parts in the interior of the meshes formed by the impression are transformed into leather, properly so-called. The interior of the meshes thus forms "compensation chambers," so to speak, with a very elastic character, while the trell pattern surrounding them offers an enormous resistance to traction. As these two qualities co-operate to obtain one common result, a driving belt of such resistance is secured that very considerable horse-power can be transmitted with far narrower belts than is now possible.

Leather in crust and horse-hide can be used in making these belts, tests with which have given such excellent results that they are now already very largely used in industrial establishments in many different lines of trade.

Testing the Strength and Stability of Magnets.

Permanent magnets, usually in the form of horseshoes, are used for many purposes, and especially in the construction of magnetos for certain types of automobiles. The usefulness of such magnetos depends upon their strength and magnetic stability. These qualities, in turn, depend upon the nature of the steel of which the magnet is made, and upon the degree and efficiency of its magnetization. The initial strength and stability of a magnet should be known before it is put to work.

An instrument has been invented for determining and measuring the degree of magnetization and the stability of horseshoe magnets. A coil capable of rotary movement, to which is attached a pointer traversing a scale, is supported between two iron pole pieces. This movable system and the scale are enclosed in an airtight box. The pole pieces extend through the walls of the box into contact plates to which the two poles of the magnet under test are applied.

When a known current is allowed to pass through the coil the pointer is deflected in proportion to the strength of the magnet, the degree of which is indicated on the scale. The magnet is not affected by this test.

For testing the stability of a magnet two adjustable coils (solenoids) are provided which are located in front of the contact plates and fit around the legs of the test magnet. If a current is allowed to pass through the solenoids in the proper direction, it will demagnetize the magnet until the pointer of the testing instrument points to zero. The value of the current required to bring about this result is measured by an ammeter and indicates the degree of the stability of the magnet tested.

By this test the magnet is deprived of its magnetic power. To make it useful it must be re-magnetised. In practice the test for initial strength is applied to every magnet in a lot, while only a few samples, picked out at random, are subjected to the stability test.

The current for the movable testing coil is derived from a single dry cell, and that from the solenoids from a storage battery. The solenoid current is regulated by rheostats.

Working the Biggest Farm in the World.

Wheat will be harvested this next fall from the world's largest farm, which comprises over 250,000 acres of Indian lands in the states of Montana and Wyoming. The lands are located on the Crow, Blackfeet and Fort Peck Indian reservations in Montana and Wyoming. In order to make the land productive a corporation with a capital of $2,000,000 has been organized.

On this huge farm not a horse will be used. Sixty-five tractors are now the property of the farm corporation, and tbe plowing record for last summer was more than an acre a minute for the working time.

Each harvester will easily handle twenty-five acres a day, and enough harvesters will be put on each 5.000 acre unit to complete the work in ten days. Forty-five days will be allowed for the plowing. Seeding is being figured in the same way.

In the last ten years the United States government has laid out extensive irrigation projects along the river bottoms in many of the reservations. Many of these systems are now completed and being operated.

When the enterprise is fully developed it is expected that their irrigated lands will raise a crop every year, while the dry lands will raise a crop every two years. The average rainfall in that part of the country is only fifteen inches per year.

Rare Elements as Paint Pigments.

Many of the rarer elements that have heretofore had little industrial application received much consideration during the war-time period. It is probably safe to say that many of them will henceforth be used as the bases of preparations destined to become of great importance in the industries and arts. Their possibilities as pigment bases, for instance, have for several years attracted much interest and speculation. Among the more obscure, or not commonly known, metals are molybdenum, cerium, lanthanum, selenium, thorium, titanium, tungsten, uranium, vanadium, zirconium, beryllium, and radium. Nearly all of the above metals, in the form of their respective insoluble compounds, have a high refractive index and consequently produce, when ground with oil, very opaque mixtures having a hiding power comparable with lead or zinc pigments.

Alfred T. Marks.

NOTES.

The latest accession to journalism in Asia is the *New East*, a copy of which has just reached us. Mr. Robertson Scott, the Editor, deserves to be congratulated on the excellent fare he provides in the Christmas number. In the Indian section, we find three special articles, one dealing with India's contribution to victory. The *New East* should prove a valuable aid for the correct understanding of the progress of affairs generally in the Asiatic continent.

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Dr. Perry Nichol's, Savannah, Missonri, deserves all honour and praise from the school people of America and especially of Missouri. He has contributed to Savanna, according to the Boston *Journal of Education*, the money for an increase of twenty per cent of all teachers' salaries. It has also given $1,000 to increase the High School Gymnasium fund for which the City has voted $1,800. Dr. Nichols has for several years been making donations to educational institutions in several States, and also assisting a number of worthy young people in securing their education. He has come to the conclusion that in realising the future aim of education, which is to make democracy safe for the world, the high school is to be the one institution for reaching the masses, and for "dealing with democracy in the rough"; and as such the high school is entitled to the consideration of the benefactors of education. Men like Dr. Nichols are a great and growing need in this country.

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A press communique says.—The Government of India have decided to prohibit with effect from the 6th September, 1919, the importation, except under license, of certain dye-stuffs (a list of which can be obtained from Collectors of Customs or from Local Governments), from all destinations other than the United Kingdom. In order, however, to safeguard the interests of the Indian dyeing industry the Government of India desire it to be clearly understood that licenses will be freely granted for the import of these dyes from foreign countries in all cases in which the licensing authority is satisfied that it has been impossible to obtain the required dyes from the United Kingdom, either because the dyes are unobtainable therefrom or are unobtainable at a reasonable price. The prohibition will not be applied to consignments *en route* on the 6th September, nor to those which have been placed on board ship on or before that date. The licensing authorities will, in the first instance, be the Collectors of Customs at the various ports, and all applications for the import of such dyes from countries other than the United Kingdom should be submitted to them.

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Those in Mysore who may be now studying the income-tax proposal of Government will do well to take into consideration the system of income-tax gradation in Canada as amended by the last Dominion Budget proposals. Under the new Dominion Scheme incomes of less than £200 per annum are exempt in the case of unmarried persons without dependants, and in other cases the exemption limit is £400. Thereafter the tax rises by a closely graduated scale. Supertax begins at the £1,000 mark, and this also is finely graduated. At the top of the scale (incomes of £ 100,000 and over) the income-tax and supertax amount to just over 60 per cent. How far the Canadian system is applicable to conditions in the Mysore State it is for the Legislature to pass an opinion, but it certainly has the appearance of being designed on scientific lines, which is more than can be said for the present system in force in any country, East or West.

Among other matters, the following matters were dealt with at the meeting of the Industries Section of the Board of Industries held on the 21st August, at Naini Tal. They also considered a note by the Director of Industries regarding the maintenance of the Technical Laboratory attached to his office as a separate Institution from the proposed Technological Institute. Quite apart from the research work which will probably be carried out by the latter, there is ample scope for the activities of the former institution judging from the number and variety of the enquiries which it is receiving particularly as to the application of known methods to the many problems which from time to time confront those engaged in industrial pursuits. For this reason the Board considered that it would be advisable to improve the status of the Industrial Chemist and that control over his department should be exercised exclusively by the Director of Industries. A report by the Director on the preliminary training of Mr. Vishwa Nath Sahai, a nominated State Technical Scholar for the study of the dyeing of textile fabrics in England, was also approved. The Board was asked to consider a proposal for employing for some of the Criminal Tribes which are shortly to be removed to Kalyanapur, near Cawnpore. The scheme submitted aims at providing work in the settlement, by the introduction of hand-loom weaving by means of the fly shuttle. Government would only be required to provide the necessary equipment at a cost of approximately Rs. 10,000. The Company submitting the proposal undertake to make all arrangements, *i.e.*, for the supply of yarn, and the marketting of the cloth. It will also pay the weavers a wage which equals that earned in the large factories by workmen occupied in similar work, and in addition to maintaining the equipment in good order, it will pay ten per cent per annum on the amount of the grant for such equipment, by way of interest and depreciation. The Board cordially supported the proposal, and recommended its adoption. The Board was pleased to note that Government has sanctioned the grant of Rs. 5,000 recommended at the last meeting for the purpose of carrying out experiments for making various colours and qualities of glass with soda manufactured locally and for evolving recipes for the same. It was also noted that Government has also been pleased to sanction the establishment of a school for the training of disabled soldiers in (*a*) motor driving and (*b*) management of oil engines, and a class of motor driving has also been experimentally attached for a year to the Technical School, Lucknow, for the training of disabled soldiers. The Board then considered the question of erecting a small factory for the extraction of oil from neem seeds, and submitted a recommendation on the subject to Government.

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It is announced for general information that the instructions for the issue of licenses for the export of mica which were issued to Collectors of Customs on 13th May, 1919, have now been modified as follows:—(1) Exports of mica of all descriptions are permitted under license to the United Kingdom, as at present. (2) Exports of all sizes and qualities of mica splittings and block, other than first and second qualities of clear and slightly stained ruby block of all sizes, are permitted under license direct to all destinations.

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We often hear remarks made about the "unchanging East," but in many directions India is arousing herself and adapting new methods and new machinery with amazing rapidity. The slow moving, patient bullock has been the theme not only of the casual tourist, but also of the more experienced writers of India for many years, and up till quite recently any proposal to substitute for this amenable animal any form of mechanical traction, except perhaps in the largest and busiest towns, would have been regarded as

entirely impracticable. The last five years, however, have taught us to expect the unexpected, and it is indeed a sign of the times that the question of mechanical traction for *Agricultural* purposes is now being seriously considered. We learn that, under the auspices of the Agricultural Department, a trial of the famous Fordson Tractor will be held at Coimbatore on the College Estate lands during the visit of His Excellency to Coimbatore next week. The Russia Engineering Works of Mount Road,—the local agents for the Fordson Tractor—are sending their Engineer Mr. Pickworth, who has had wide experience in this and in other countries in dealing with this tractor to carry out a thorough trial and demonstration of ploughing, harrowing and, as this engine can be used for stationery work, of chaff cutting and ginning. It is possible also that the Public of Madras will be able to see the kind of work that these tractors can do, at Guindy, where we believe another Fordson, and a Cleveland Caterpillar tractor imported by Messrs. Best & Co., will shortly be seen at work. This is a step in the right direction as the possibilities of Motor ploughing in certain conditions are undoubtedly very large.

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In this issue we publish two interesting articles on Education—one from the pen of Mr. C. R. Reddy, I. G. of Education in Mysore and the other from that of Professor Laurie, the Principal of the famous Technical College at Edinborgh.

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Among the products of the British Empire which before the War were not utilised in this country to the extent they might have been, cocoa takes a prominent place. The quantity of cocoa produced in British Countries in 1913 was more than three times the amount consumed in the United Kingdom, yet this country only obtained about one-half its supplies from those sources, the remainder consisting largely of South American cocoa and foreign cocoa shipped *via.* continental countries. Not only was this the case but we were importing large quantities of prepared cocoa and chocolate from foreign countries which had been manufactured there from British grown cocoa. During the war the position improved and a much larger proportion of the raw cocoa came from the Empire, no less than 86 per cent of the total imports into this country coming from British possessions in 1917, and it is to be hoped that this state of affairs will continue. The importance of the matter will be realised when it is stated that in 1916 the total imports were valued at no less than six and three quarter million pounds sterling. The question of the production of cocoa in the different countries of the empire, the world's consumption, and the cocoa trade of the United Kingdom is fully discussed in an article in the current number of the *Bulletin of the Imperial Institute*. Of the many interesting points brought out two call for special mention. The first is the unprecedented growth of the cocoa industry in the Gold Coast, where the product is grown and prepared for the market entirely by the natives. The Colony commenced to export cocoa in 1891 and it now produces more than one-quarter of the world's output. The other equally remarkable fact is the enormous increase in the consumption of cocoa in the United States in recent years. The consumption has trebled since 1913 and about one-half the total quantity produced in the world now goes to the States. The cocoa industry of the Gold Coast is also dealt with at length in a message addressed to the Legislative Council of the Colony by Sir Hugh Clifford, the Governor, which appears in the same number of the Bulletin.

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The Children's Institute of the Osaka Municipal Corporation is now being built at Imamiya. It is intended to carry out the following works: 1. Education: 2. Nourishment: 3. Sleep and rest: 4. Lodging: 5.

Clothes: 6. Play and exercise 7. Amusement: 8. Disease: 9. Abnormity in the body and mind: 10. Training. Dr. Takemura and three other members from among the physicians and teachers, besides, clerks, nurses and others have been nominated. The institute is intended to give advice to the citizens in the care of their children regarding the above-mentioned topics. The enterprise is considered entirely a new trial throughout the country.

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Reviewing the Annual Report on the working of the Co-operative Societies in the Bombay Presidency for 1917-1918, the Government of Bombay observe :—"No new Housing Societies were established during the year, but those already in existence appear to have done useful work, and to *have consolidated their position. A great* future may be expected for this type in the present congested state of Bombay which has created an insistent demand for decent accommodation amongst an educated and thrifty class of people to whom co-operation should appeal with increasing force. The recent grant of State aid in the form of long term loans on suitable rates of interest should stimulate the development of Housing Societies which have always found their greatest stumbling block to be the difficulty of attracting capital on favourable terms." In the last sentence is a suggestion for many other governments to take up.

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In mail week the prospectus was issued in London of the British Overseas Bank, Ltd., which has been formed under the auspices of a strong group of banks, including the Imperial Ottoman Bank and the Anglo-South American Bank, Ltd. It is pointed out in the prospectus that it has been increasingly evident since the termination of the war that the future prosperity of this country will be largely dependent upon the early and rapid resumption and expansion of foreign trade, and that as a means to secure this end it is felt that increased and improved banking facilities will be necessary, and for this purpose the bank has been formed. The business of the bank will be conducted on specialised lines and effective co-operation with trade will be maintained by the presence on the Governing Council of trade interests, thereby securing benefits to the general business community as well as to the bank. The bank will facilitate the foreign trade of the British Isles and the Empire by specialising in all matters of exchange, payments, and receipts abroad, and the handling of foreign collections, documents, and securities. Commercial credits will be issued, and the bank will give its acceptance to bills in connection with Home, Colonial, and International trade, and agencies and branches will be established, if and where necessary.

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The authorised capital of the bank is £5,000,000, divided into A and B ordinary shares of £5 each, of which the A class ranks first for a cumulative dividend of 6 per cent, and after a dividend of an equal amount has been paid on the B shares, the arrangement is that in any further division of profits the B shares shall receive twice as much as the A shares. The constituent banks have taken up at par 200,000 of the B shares, and the issue made this week consisted of 200,000 A shares, 20,000 of which have been allotted to the *Prudential Assurance Company.* With the great advantage of the support of the eight constituent banks, the British Overseas Bank starts its career under the most favourable auspices. Of the need for an institution of this character there is no doubt, and it may be expected to play a very important part in future trade development. As to the regions with which it will specially concern itself, we note that among the constituent banks are the Imperial Ottoman Bank, with its wide connections throughout

the Near East, and the Anglo-South American Bank, Ltd. These banks are respectively represented on the Governing Council of the British Overseas Bank by Mr. E. W. H. Barry and Mr. R. J. Hose.

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Mr. Rushbrook Williams in his recently published "India in the year 1917-18," points out that expenditure from all sources on Education works out at 7¾d. per head. The expenditure from provincial including central funds comes to only 2½d. per head as compared with 7s. 9d. in England and Wales. It must be plain says Mr. Williams "that until the proportion of illiterates can be raised, the immense mass of the peoples of India will remain, poor, ignorant and helpless far beyond the standards of Education in the West." He states that the rate of growth has been insufficient for the needs of the country and adds:—"An examination of the problems presented by these types of Education, and of the efforts which the administration is constantly making to solve them, reveals with greater clearness of the present position and the urgent necessity for embarking upon a largely planned constructive Policy for which money must be found in some way or other.

GLEANINGS.

The following note on boiling of Burma rice by Mr. Wibley may prove useful at the present time:—A great deal of the prejudice against this cheap and wholesome food is due to the want of knowledge of the proper method of cooking it. The method of cooking Bengal rice, by putting it into cold water and letting it boil up, must be entirely reversed in the case of Burma rice. This should be cleaned in hot water, and placed in boiling water, just enough to cover the rice, with about one inch over. It is then boiled until practically all the water is absorbed the rice then turns out flaky and palatable, and there is no reason why it should cause indigestion and similar troubles. It is said that the reason, why Burma rice should be treated differently is that is machine cleaned, whereas Bengal rice has to be boiled to remove the husks.

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Plans for the electrification of the Jamaica Railway have been completed. The engineer of the Westinghouse Company, who went into the question has returned to United States of America, taking with him the plans on which he will prepare his report for transmission to the Government. The change, if decided upon by the legislature, will involve an expenditure of at least £800,000. In the meantime six locomotives are being constructed by the Baldwin Company of Pennsylvania, to augment the rolling stock of the Railway. We in Mysore must speed up our power surveys and plans.

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The movement for the consolidation of interests in the Belgian glass industry appears to be taking root in other industries, says the *Board of Trade Journal*. According to the Press, a metallurgical trust, representing 300,000,000 francs capital, is in process of formation. It is expected, in spite of the opposition of conflicting interests, that this will embrace the whole industry. After rebuilding and re-equipping existing works, the trust proposes to build three or four large factories, each specialising in the production of selected classes of goods.

The possibility of utilising British Guiana Timber for supplying some of the requirements of European Railways, particularly in the form of sleepers, is the subject of investigation. Although British Guiana has the timber it is feared that the shortage of labour will prevent the development of a railway sleeper industry in the colony. Another difficulty is the lack of shipping accommodation. Here is an opportunity for Indian timber. Mysore can well look up and see if she cannot get a hand in it.

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The Government of Jamaica has decided to develop the sisal hemp industry on the plains of the Colony. In addition to encouraging the extensive cultivation of the product, the Government has been urged to erect a factory for the preparation of the fibre for the market. This proposal will, however, be allowed to stand over a year. Meanwhile what is the progress in this new industry in the Mysore State. A return would do much good at least once a quarter.

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Apropos of Land Banks in Mysore, we might state that it has been decided that the question of an Agricultural Bank for Jamaica should be laid before the Royal Commission which is expected to visit that colony in the near future. There is a Land Bank in Southern Rhodesia, which is doing much good. It makes loans to settlers on easy terms of repayment, for the purpose of improving and developing their agricultural holdings.

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Two hundred thousand acres of forest land in great Britain are to be replanted, at a cost for planting and maintenance the first ten years of Rs. 21,000,000, according to announcement by the Government. The trees will replace some of the heavy timber cut down during the war, and provide additional forests so that the country may be independant of other timber sources in case of emergency.

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The Government of India are making an enquiry into the causes of the perishing of paper of India, which involves premature destruction of old books and records, and it is understood that in this connection Mr. Chapman, Librarian of the Imperial Library, will be visiting all important libraries in India containing collections of old books with the object of finding out their condition.

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We note from the *Canadian Foresty Journal* that wood block paving, which in European cities has long been the favourite, is increasing in use in Canada, despite the frequent clumsy methods used by town engineers in laying it. Rightly laid it is an ideal paying material. Much wood that at present goes to waste in this State can be collected and exported to benefit.

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The Wheat Commission estimates that the loss on bread subsidy in England during the current financial year would come to £ 47,900,000. It further estimates that without control or subsidy the price of the flour pound loaf would come to 1s. 1d. instead of 9½d. The loans and taxes, of course, provide funds for meeting the loss on this subsidy.

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The City Authorities of Brussels have decided to hold the National Industrial Fair in April, 1920, instead of next September, as originally intended. Reconstruction is proceeding rapidly in all industries, but it is natural that many would-be exhibitors are not ready to participate in a Fair this year.

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Upwards of 600 small diamonds have been recovered in the Gold Coast Colony from the shallow quartz gravels of the Abomo stream and the adjacent ridge some 65 miles to the North West of the Accra, the capital of the Colony.

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The advisability of electrifying the South African Railways or portions of the system is being studied by the Union Government. Arrangements have been made to secure an expert report on the matter.

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Tropical Life for July, 1919, is as interesting as ever. Sir Alfred Chatterton's paper on "Sisal Cultivation" published in the April issue of this *Journal* in extracted and favorably referred to.

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A large fruit cannery is to be erected at Port Elizabeth by the African Canning and Packing Company (Limited). The capital of the Company is £50,000. We are still debating on the subject in Mysore!

TOPICS FROM ECONOMIC PERIODICALS.

RURAL PRIMARY EDUCATION.

In the Social Service Quarterly for July, 1919, there is an interesting article on Education in Rural Primary Schools by Mr. S. H. Fremantle, I.C.S. He writes:—

Among the foremost problems of reconstruction in all countries is that of education. The stern ideal of War has brought all theories to a test. It has shown us more clearly than ever before that the true wealth of a nation is in its citizens, and has done much to make clear the defects of the various national systems of education. The British system, perhaps, has given better results than were expected of it. The national schools of the masses have produced their heroes of field and sea and air, as well as the public schools of the classes, and the standard of honour, cheerfulness and discipline has probably been higher in the British than in any other army. But many defects have come to view—the large proportion of men, especially in the towns, found to be physically unfit, the neglect of the sciences and of the application of science to industry, the limited outlook and undemocratic atmosphere of the public schools, the failure to provide a highway for clever boys from primary to secondary school and university thus allowing much talent to go to waste, and, lastly, the turning out into the world at the age of fourteen of 90 per cent of the boys of the country, with the result that very many youths take up blind-alley occupations which lead to nothing and so swell the number of unskilled labourers. The case was considered so urgent that at the very height of the War, a trained educationist (Mr. Fisher) was for the first time appointed Minister of Education, and all parties combined to welcome the Bill which he introduced in 1918. The principal object of the Education Act is "the establishment of a universal system of continuation schools," in which boys and girls between 14 and 16 (and after the lapse of 7 years between 14 and 18) will be given a part-time education. But the Act does much more than this. For it defines the responsibility of the local educational authorities for preparing schemes for the progressive development and comprehensive organization of education, and makes provision for nursery schools, for attention to health and physical training and for the adequate linking up of primary and secondary education.

In India, there has been no approximation to the war conditions of Europe; but she has not remained unaffected by the general world ferment. Many thousands of her sons have served in Europe and in distant quarters of Asia and Africa, and have returned with new ideas of men and things, while the economic disturbance due to the War has affected even the remotest villages. Here again it was in the very height of the conflict that India's new charter, the announcement of 20th August, 1917, was promulgated. By it the ideal of Self-Government within the Empire was first definitely accepted by Government, and in working out the first steps to be taken towards the attainment of this ideal it has been decided for better or for worse that democratic principles must be introduced, and the powers now wielded by the official classes be placed in the hands of the representatives of the mass of the people, the great majority of whom are still illiterate. For, according to the report of the Southborough Committees, there will be over 5 million voters. An urgent need has, therefore, arisen on political grounds for the wider diffusion of primary education. On economic grounds also a quicker advance is necessary. The scarcity of shipping and the restrictions on exports from the belligerent countries have drawn prominent attention to the economic weakness of India, and the operations of the Munitions Board, assisted by private enterprise, have laid the foundations of many industries, which under the fostering care of Government will enable the abundant raw material of India to be worked up in the country itself, and so largely increase the demand for a skilled and intelligent labour supply. At the same time, the more general diffusion of improved agricultural methods and machinery is increasing the need for a more intelligent and enterprising peasantry.

With these converging reasons impelling an educational advance, it is not surprising to find that in most provinces Bills have been introduced in their respective Legislative Councils allowing local bodies to make education free and compulsory within their jurisdictions, and that much larger sums of public money are being devoted to the extension of primary education, for the opening of new schools, for the increase of the pay of teachers and of facilities for training them, and for the provision of new schools buildings. The aim is no less than to remove the reproach of illiteracy from India and to make primary education ultimately universal throughout the country.

The measures noted above for the immediate diffusion of facilities for primary education must, of course, have the effect of extending some degree of literacy among the masses; but if our efforts are

to end there, it is probable the result will be disappointing. There will no doubt be a largely increased attendance, but much of it will be on paper, and though more boys will attend school for short periods they will leave with a very rudimentary knowledge of the three R's. which in the atmosphere of an Indian village they will very soon forget. In his book 'Across the Bridges,' which is an illuminating review of the social conditions prevailing in the poorer portions of South London, Mr. Patterson tells us that even there many boys after several years of school practically relapse into illiteracy. If this is the case in the metropolis of the world, how much more will it be the case in India! Further, since the schooling facilities already provided are in most places not being utilised to their full capacity, those classes who do not see the advantage of education, and, therefore, do not now send their sons to school have to be taught to do so either by persuasion or compulsion. There are no doubt certain towns, and perhaps certain districts or portions of districts where the proportion of boys now under instruction is so high that compulsion may be properly employed to bring in the remainder; but the greater portion of the country is too backward to allow of compulsion, and persuasion must, for the present, be relied on to fill the schools.

There are, therefore, two excellent reasons why it is incumbent on us now to examine our present system of education in order to satisfy ourselves that it fits the needs of the country: firstly, as very large sums of public money are now to be expended on the extension of the system, it is necessary to see that the money is profitably spent; and, secondly, because those classes who do not send their children to school have to be persuaded or compelled to do so, it is necessary to satisfy ourselves that the education imparted is of the right kind.

In a pamphlet published in 1915, called "A System of Rural Education," I have endeavoured to point out the defects of primary instruction as it exists in the rural tracts of the Upper Indian Province with which I am acquainted, and I do not think that the position in other provinces is very different. The main defect was and still is that the education given is wholly literary, and is not co-ordinated with the life of the people, and especially with agriculture, the main interest of the country, side. A boy when he walks into the school compound enters a new indoor life of books and paper and sums quite unconnected with his outdoor life at home in which the sowing, tending, and reaping of crops, and the care of animals are the chief interests. The school times and seasons are not fixed to fit in with agriculture. The teachers, though in nearly all cases villagers themselves, are trained in an urban and literary atmosphere. In these circumstances, it is surely not surprising to find that there is no idea of sending a boy to school in order that he may become a better cultivator or a more intelligent citizen. A boy is sent to school in order that by learning to read and write he may qualify for literate or semi-literate employment, and so earn some small monthly salary to help the family budget; or when a boy is still too small to be of use in agriculture or industry he is sent to school for three or four years to keep him out of mischief. In the latter case, he is removed when he becomes old enough to work and before he can read and write correctly, so that he speedily forgets nearly all that he has been taught. If this is education in practice, the measures now being taken for the extension of education can bear little real fruit.

The remedy, so far at least as rural schools are concerned, must surely be the introduction of an agricultural atmosphere, so that the life of the school may be co-ordinated with the life of the home. To achieve this purpose the following steps can be taken:—

First:—The training of teachers. Normal schools and training classes should be situated not in crowded towns, but in villages or on the outskirts of small towns where agricultural land is available. To all such institutions a garden should be attached, and, if possible, a small demonstration farm worked under the advice of the Agricultural Department. The curriculum should include a course of rural science teaching in which the elementary sciences are taught in rational co-ordination with one another. No person is fit to be a teacher of a child if he cannot answer the common questions in natural history and physics which every healthy child asks, and the regular school subjects cannot be made interesting or practical for the sons of agriculturists without constant references to rural science. The number of normal schools is quite inadequate and the hasty improvisation of training classes attached to ordinary schools in order that a large proportion of the teachers may be classified as "trained" does not really meet the needs of the case.

Second:—All schools of any size should have gardens attached, comprising.—

(1) A small ornamental garden of flowers and flowering shrubs to beautify the school building, (2) a shady portion which can be used not only for physical exercises and games but for an open air school to supplement the accommodation in the school-house. For this purpose it would be necessary to have platforms of earth covered by light sheds during the rains, (3) individual single or dual plots where the boys can grow any flowers or vegetables they fancy, (4) a small field to be used for

demonstrating the growth of such varieties of crops and vegetables as may be recommended by the Agricultural Department, (5) an orchard of fruit trees of various kinds, and (6) a nursery of trees to be given away or sold.

Such a garden has been described by the present writer in the March number of the Agricultural Journal of India. It would average about two-thirds of an acre in size. It would require an enclosure wall to keep out animals and thieves, and, unless situated in a canal tract, a good well. It is also essential for the success of the gardens, as well as desirable on other grounds, that a small house with court-yard be provided for the head teacher, and also if possible bachelor quarters for one or more assistant teachers. On the other hand, a large school-house would be unnecessary since extra pupils would be accommodated in the garden as explained above.

The objects of school gardens have been defined in the article mentioned above to be the following :—

(1) To beautify the surroundings of the school,
(2) To limit expenditure on school buildings,
(3) To introduce an agricultural atmosphere into the school,
(4) To interest parents, school committees, and the public in the school as a village institution,
(5) To stimulate in the neighbourhood interest in new vegetables, crops and varieties and to introduce to the locality such as may be found suitable,
(6) To inculcate in the minds of the boys the dignity of labour, and introduce them to the spirit of service for the community,
(7) To emphasize the importance to be attached to agriculture, and
(8) To provide examples for the teaching of geography, arithmetic, mensuration, and kindred subjects and material for nature study.

A natural development is an exhibition at district quarters of the produce of school-gardens which can be combined with an exhibition of products of other departments of the schools, such as drawing, needle-work and basket-weaving.

Third :—Mathematical and other text-books should be adapted to an agricultural population, and questions and problems contained in them should be such as arise in actual practice in field, garden, and bazaar. A new arithmetic for vernacular schools was recently approved in one province, the examples in which contained from first to last no mention of seed, cattle manure, irrigation or even of the rent of land. The examples were all drawn from the commercial life of a European country.

Fourth :—The school times and seasons should be such as suit the convenience of agriculturists. That is to say that the school vacations should be liberal in length, and should coincide with the principal harvest or harvests. On the other hand, the holidays given on account of religious festivals and fasts should be confined to those actually necessary in the circumstances of a particular school. There appears to be no necessity in non-Christian schools, any more than in mills and factories, to allow a Sunday holiday where there is a sanctioned holiday two or three days before or after Sunday.

In this connection, it is at least worth consideration, whether the attempt to make primary education universal will not be more quickly realized if the aim be not too high, and at least in rural tracts a system of half-time instruction be generally introduced instead of the whole-time system now prevailing. Children of working agriculturists either do not come to school at all or else come only while they are very young. If the curriculum were altered so that they could complete the course by attendence for say three hours in the morning or evening, it is very probable that their parents would allow them to stay on in the school even after the age at which they become useful in the fields, and so the "formative" years between 12 and 14 would not be wholly barren of educational growth. An experiment on these lines is being tried at Allahabad and gives promise of being successful. The saving in the cost of buildings is obvious. For only half the boys in the school need be present at one time, and while most villages can provide some verandah or shed in which 25 boys can be seated fairly comfortably a special building would probably be required to accommodate 50 boys. Instruction too would be more efficient since more individual attention could be given to the pupils. Lastly, there would be a special advantage from an educational point of view. For boys of tender age cannot be learning for more than three or at most four hours in the day, and if they remain, as they frequently do, double this time in the school they are not making the best use of their time; for the teachers have neither the competeuce nor the desire to show them how best to empoly their leisure. Until schools are better formed and teachers are more competent and alive to their responsibilities for educating as well as for instructing, children had better spend the time they are not in class at home helping their parents in light tasks and getting that practical education which is not provided in the school.

Fifth :—If, however, the rural schools are to retain their whole time system, much can be done to

brighten the lives of the children and train their bodies by the introduction of organized games and action songs. At present, such training is confined to drill and physical exercises. Some drill is no doubt required for disciplinary purposes, but it should be of the simplest character, while physical exercises are only suitable for the older children and should occupy only a few minutes in the day. The only games, so far as I have seen, encourged in schools are English games, which require more or less expensive materials, and are, therefore, unsuitable for village schools. There are, however, several excellent indigenous games which are played without materials, and deserve to be more generally known and practised. Some action songs too have been adopted for Indian children and are much appreciated in the few schools where they have been introduced. They should be generally adopted in girls' and infants' classes.

Sixth :—If the schools were in touch with the agricultural life of the people, and the sons of working agriculturists were allowed by their parents to stay on in the part-time schools till they had completed the primary course, an opportunity and a demand would arise for continuation classes in special branches of agricultural science to be conducted at convenient seasons in central schools by peripatetic instructors, specially trained for this purpose.

Seventh :—The division of the whole country into school districts with one or more large central schools, and, if necessary, small feeder schools located at convenient places and the constitution of school committees for such districts are urgent needs. In a few provinces, some progress has been made towards such an organization, but it has nowhere, so far as I know, been perfected and carried to its logical conclusion. For even where districts have been defined and committees appointed, no real responsibilities have been given to them and the schools are, on their economic as well as their technical side, entirely controlled and managed by the inspecting staff. It will no doubt be said that in some places school committees have been tried and have not proved successful. And it is no doubt true that it is useless to appoint a committee unless firstly definite and responsible duties are given to its members, and secondly efforts are made by the local officers of Government and the District Board to train the committees to carry out the duties assigned to them and to encourage them in any efforts they make to overcome local apathy and factious opposition. In some places, it might be best to nominate the committees, in others to elect them, and the school district might be the electoral unit of the local government system. But whatever constitution be adopted, the formation of responsible and representative school committees would not only create in the community an interest in the schools but would afford a first and much needed introduction to real local self-government.

Eighth :—The recognition of the school by the local authorities and residents as the centre of public life. Durbar Day and other special holidays might be commemorated by the organization of entertainments, sports, and illuminations. Religious plays might be performed and recitations made from religious books out of school hours, while when peripatetic agricultural inspectors are available the school might be made the centre of their demonstrations. School libraries and museums are natural developments useful to the general public as well as to the school children themselves. All activities of this nature tend to popularise the school and to make it fit in with the life of the people.

Ninth :—There is the encouragment of teachers. Much is being done to increase the number trained teachers, and some suggestions for improving the training of those destined to teach in rural schools have been noted above. Steps are also being taken to improve their salaries which are still miserably low in comparison, for instance, with those of skilled artisans. These measures will have some effect in improving their status and influence. But it will be impossible for many years at any rate to train all teachers as they should be trained and to pay them all as they should be paid. With longer harvest holidays as proposed above, courses in special subjects, such as nature study and rural economics, and special branches of agriculture, such as seed selection and plant diseases, could be introduced, and teachers' conferences arranged at which teachers would be brought together to compare notes of their work and to have their minds enlarged by fresh experiences. The teacher might be, as he is frequently in America, and as he is entitled to be, by his education and position, the leader and guide of the whole rural community, and the school would then be, as it should be, the centre of rural life.

Tenth :—Closely connected with the last two suggestions is the necessity for the development of a body of public opinion in favour of a better and broader policy of primary education. The latter has suffered by having no directing authority of its own and by the greater interest taken by the upper middle classes in secondary and higher education. In order to educate public opinion in the matter, I should like to see formed an association, the members of which engage to estimate educational results by quality as well as by quantity, to study educational

principles and the latest developments of practice in other countries, and to endeavour by close acquaintance with practical conditions in the various parts of India to indicate how to adapt them for local use.

These are some of the directions in which it seems to me our rural school system requires to be reconstructed. The great secret of successful education lies in interest—interest of the pupils in their work, interest of the teachers in their pupils, interest of the parents and villagers in the school, and interest of the local authority and the educated public in thinking out a sound system and watching over its working.

At present, the system is cold, lifeless and artificial. The children are bored with unfamiliar literary work and this attitude of boredom naturally reacts on the teachers. The parents regard the school and the instruction given in it as something quite apart from village life, while the local authorities, the inspecting staff, and the educated public too often regard it merely as a machine for passing boys through certain standards and examinations.

What a change it would be if the children's minds were opened and their interest aroused by introduction to and explanation of the mysterious processes of nature, if teachers were not only able to explain these things to their pupils but had been led to study and were prepared to discuss with the leading residents the rural economy of their neighbourhoods, if local men were given some definite responsibility for the succeessful working of the schools, if parents and villagers were to gain some acquaintance with new varieties and methods by the demonstration work going on in the school gardens, and if local authorities and their staff and the local magnates encouraged these and other wholesome activities by all the means in their power!

An intensive movement of this kind would surely do more for the production of that body of intelligent citizens which is admittedly so necessary than the compulsory extension of education to all and sundry which is now being feverishly pressed forward in many quarters. Until the objects and results of education are better appreciated by the general public, its artificial extentsion will have little good result and is likely indeed to defeat its own object by antagonising parents. On the other hand, the reconstruction of the school as a living organism in village life would involve real and steady progress and would lay the foundation of a new and better rural social order.

CALCUTTA UNIVERSITY COMMISSION REPORT.

The *Times* (*Educational Supplement*) says:—

A superficial criticism of the report of the Calcutta University Commission might be made without reading so much as a paragraph, on the ground that it fills five substantial octavo volumes. But length and prolixity are not synonymous, and skilful arrangement permits of the main conclusions being well understood after half-an-hour's reading. The thoroughness of the survey has been disadvantageous in one respect, for it has provided an excuse for the five or six months occupied in the mere mechanical work of production from a Government press which, apart from routine duties, has been mainly absorbed in the issue of papers connected with political reform. Those who complain of the vast surface covered by the report would do well to remember the difficult and complex issues covered by the terms of reference.

Lord Chelmsford announced the decision to establish a Commission in his speech at the annual convocation of the Calcutta University early in 1917. Distinguished educationists in this country had to be approached, and the Commission was not formally appointed until the following September. Sir Michael Sadler and his colleagues began their work in India towards the end of November. The hope that one cold-whether season would suffice for the inquiries was not fulfilled. They extended over two seasons, and the intervening summer was a time of strenuous labour for the Commissioners. While they were primarily concerned with Calcutta, they visited collegiate institutions throughout the country, in accordance with pledges made in the Supreme Legislature, and the recommendations made, broad in principle though not in full detail, are of general application to secondary and higher educational policy throughout the country. Visits were made to most of the colleges and many of the high schools of the country districts of Bengal, while conditions in Calcutta were the subject of thorough investigation at first hand. In a word, the Report makes a far more complete survey of the problems of Indian education than any that has hitherto been attempted.

When making the first announcement, Lord Chelmsford said that the Commission would be on similar lines and with terms of reference following those of the Royal Commission on the University Education in London. This body, presided over by Lord Haldane, was appointed in February, 1909

and presented its final Report in March, 1913. The inquiries of the Calcutta Commission covered, not four years, but less than 18 months, though the problems for consideration, like the geographical range of investigation, were far wider and more complex than those of its prototype. To say nothing of visits to other parts of India, no other university in the world approaches Calcutta in the magnitude of the number of students under its control or the scattered nature of the affiliated colleges. Its jurisdiction extends over an area of 376,000 square miles, comprising a population of nearly 65½ millions. The Senate controls 29 per cent of the total number of colleges in British India, and within its area there are close upon half the high schools of the country.

A Calcutta telegram has pointed out that the fact that the Indian political problem is, in its roots, essentially an educational problem, and that the educational system established at the beginning of the Victorian era has, in the main, determined the form of the political movements to-day, gives the Report great political importance. It follows that the recommendations will be examined with solicitude and keenest vigilance by Indian political leaders, especially in Bengal, where there is an almost religious faith in the benefits of higher education. It is an enormous advantage, in this connection, that unanimity has been reached on all the main issues by the four educational experts from this country, the two Indian members, and head of the Education Department in Bengal who constituted this strong Commission. The only reservations—and these upon non-essential points—are by Dr. J. W. Gregory, of Glasgow, and Dr. Ziauddin Ahmed, of the Mahomedan Anglo-Oriental College, Aligarh. The other Indian member, Sir Asutosh Mukerjee, a Judge of the High Court of Bengal, has been the strong dominating force in the Calcutta University Senate for many years, and it is highly significant of the clamant need for reform that he should assent both to the depressing survey of present day conditions and to each of the comprehensive recommendations for complete reconstruction and reorganization.

The Report has a crucial bearing on those problems of material prosperity and social reform which are of at least equal importance to political change. One aim of the Commission has been to devise new facilities for technological training, which is now admittedly meagre and insufficient. It is scarcely possible to exaggerate the potentialities of Indian industrial and commercial development at the present time, and it is lamentable that comparatively little is being done to train the youths of Bengal for the opportunities the new era will bring. Sir Michael Sadler and his colleagues are convinced that an improved secondary education for boys, *i.e.*, one of the chief conditions upon which the industrial development of the province will be found possible. They have made proposals for the old tradition of high school studies, now too exclusively leading to careers in law or Government service, to be modernized without being deprived of the equality of liberal culture.

The proposal that the university course proper should begin after the present intermediate examination is the pivot on which, in this respect, the scheme of the Commission turns. Under their plan, in the last two years of higher secondary education a boy will be able to choose between courses which will prepare him respectively for the university or for an industrial career, or for agriculture, or for teaching, or for the more subordinate posts in the Government service. Sir Michael Sadler claims that under this and co-ordinated proposals industry and business will have at their command large stream of well educated and physically efficient recruits ready, at about 18 years of age, to enter upon the duties of practical life. There are many signs that under the pressure of poverty the old prejudices against an industrial or a commercial career are breaking down. Hence these proposals come at the appropriate stage in the moral and material development of Bengal.

SPEECHES AND PRONOUNCEMENTS.

FLAX GROWING IN THE EMPIRE.

Interim Report of Committee.

In February, 1918, the Empire Flax Growing Committee was appointed by the President of the Board of Trade to investigate in all its bearings the question of increasing the supply of flax in the British Empire. Lord Colwyn was the Chairman, Sir Frank Warner the Vice-Chairman, and Mr. J. A. Todd Secretary. This Committee has now issued an Interim Report on the general situation and prospects of supply.

SUPPLY OF FLAX FIBRE.

The problem of flax supply involves the consideration of two questions. The first question, that of the supply of fibre, is closely dependent on the second, namely, the provision of seed, but the considerations affecting the two questions are so different that it has been desirable throughout this Report to treat them separately. The following table, based on normal pre-war figures supplied by the Board of Trade, gives the world's commercial crops (*i.e.*, excluding domestic consumption) and the mill consumption of the chief flax manufacturing countries :—

	Normal Commercial Crop pre-war.	Normal Mill Consumption pre-war.
	In thousands of tons.	
Russia	400	80
United Kingdom ...	12	100
Belgium	24	130
France	20	48
Germany and Austria.	36	140
Other Countries ...	14	8
Total ...	506	506

It would not, says the Report, be safe to take these figures as anything more than a rough approximation to the actual position, but the only further information available is that Russia's total pre-war product was normally about 500,000 tons, and of this about 250,000 tons was usually exported. About 80,000 to 100,000 tons were consumed in the Russian factories, so that in the absence of direct statistics we must infer that about 200,000 tons of the Russian crop were used up by domestic consumption. It is estimated that of the annual requirements of the United Kingdom before the war, which, as indicated above, were normally about 100,000 tons, Ireland contributed some 10,000 tons, Belgium, France, and Holland together about 10,000, and Russia about 70,000 to 80,000 tons.

EFFECTS OF THE WAR.

The effect of the war upon all these external sources of supply was nothing short of disastrous. The flax growing districts in Belgium and parts of Northern France were the first to be overrun by the enemy, and the collapse of Russia in 1917 practically removed the principal remaining source of supply. The Dutch crop has also been very seriously reduced by war conditions, while the share of that crop obtainable by the United Kingdom was reduced to a minimum. The districts where Russian flax is produced are still not freely accessible to the British industry, while the free export of flax from Belgium, Holland, and Northern France is unlikely to be resumed for some time to come. The question of obtaining supplies from other sources, therefore, became during the war, and still is, of the first importance for the British linen industry. As the result of the abnormal conditions created by the war there has been a marked development of flax growing in England and Scotland, a substantial increase in the acreage in the North of Ireland, and a considerable extention of flax cultivation in the South of Ireland. There has also been an encouraging development of other flax fields within the Empire. Although these abnormal conditions may before long be modified, the present condition of the supplies of flax is still far from satisfactory, and the future prospects of the linen industry of the United Kingdom are threatened by a shortage of supplies.

The Committee, therefore, feels that the Government support which has been given during the War (1) to foster the revival of flax growing within the United Kingdom, and (2) to encourage its extention throughout the Empire, will require to be continued for a further period. What has been done in each of these sections is described in the Report, from which we give the following summary :—

THE UNITED KINGDOM.

Until well into the nineteenth century flax growing was a considerable industry in practically all parts of the British Islands. The reason which led to the almost complete disappearance of the crop from England and Scotland may be described as a combination of economic conditions which made it no longer profitable, *e.g.*, the increasing labour cost and the difficulty of getting labour owing to the

general movement of rural population into the towns, and the low price at which flax could be imported from Russia. A few mills, dependent almost entirely on imported raw material, still remained in the South of England, while Dundee and Dunfermline carried on a large spinning and weaving industry, second only to that of the North of Ireland in importance. In Ireland, however, flax growing persisted on a much larger scale, not only because *the climate seems to be peculiarly suited for it, but* also because the spinning and weaving of the resultant fibre had there been developed on a large scale in the North; principally, however, because the crop suited the small farmer class who form the majority of the Irish rural population. Even before the war, however, the general situation of the trade with regard to the supply of its raw material was becoming unsatisfactory. Consumption had overtaken production, and manufacturers were faced with scarcity.

RECOVERING THE FIBRE.

The Committee soon realised that the problem of increasing the production of flax was not only an agricultural but an industrial one. Given a supply of seed, excellent flax can be grown in many parts of the Empire, and the United Kingdom itself is probably unsurpassed both in soil and climate for the growth of flax. The real difficulty arises from the fact that the harvesting of the crop and its preparation for the spinning mills involve a demand for labour which is difficult to meet under the present system of working in countries such as the United Kingdom, where labour is scarce and dear. No such difficulty arises in the production of seed, either for linseed or for sowing for fibre. Where no attempt is made to recover the fibre, as in Western Canada, *the crop can be harvested and threshed by* the ordinary machinery used for all cereal crops. If there is to be any permanent increase of the acreage under flax in the United Kingdom, there will have to be an entire change in the system under which the crop has formerly been grown and handled. Under the system prevailing in Ireland the farmer not only grows the flax but also puts it through the first manufacturing process, known as "retting." The next process, known as "scutching," is also done in small local scutching mills, generally on account of the farmer. Thus what the grower sells is not simply raw material, but a partly manufactured article, the trade being in this respect almost unique. The objection to this system is that in effect it limits the production and greatly restricts the possibility of improvement in the quality of the product.

It has now become generally accepted that it is necessary to introduce an entirely new method, which has already been instituted in various experimental areas, some of which date back considerably before the war. The new system is that the flax should be bought from the farmer "on foot," as it is called (*i.e.*, as a standing crop in the field), or delivered, pulled and dried, and that the whole process of retting should be undertaken by the purchaser, who, working on a large scale and at centralised points in well-equipped factories, would be able to *have the best machinery and appliances of all kinds* for the purpose. At the same time, by introducing the process of controlled retting with artificial heating of the water, this system would get rid of the *limitation of time imposed by the shortness of the* season available for natural retting, so that a longer period would be available for the handling of the year's crop.

Probably the greatest permanent difficulty in securing an adequate production of flax in this country, either in Ireland or Great Britain, is the labour supply for the actual harvesting of the crop. Flax must, if possible, be pulled; not cut and the difficulty of getting sufficient labour to handle the crop just at the time when other crops are ready for harvesting has been so great as to require in England and Scotland special arrangements for imported temporary labour. The measures which have been adopted at considerable expense during war time would not be available, even if they were profitable in peace time, and it is greatly desired that some mechanical means of getting over this difficulty should be discovered. Several varieties of pulling machines have so far been produced, but all of them are apparently still more or less in the experimental stage. Complete success in this direction would, however, alter the whole question with regard to flax growing, especially in Great Britain.

WAR MEASURES.

In view of these explanations, it remains to describe what has actually been done during the war in *the direction of securing an increased supply of* home-grown flax. Ireland is the one part of the United Kingdom where the flax growing industry has survived. It is, therefore, to Ireland that we *must look for the greatest development of the industry* in the United Kingdom. The area under flax in Ireland in 1914 was 49,000 acres, and in 1918, 143,000 acres. But for the shortage of seed and the want of a sufficient number of instructors, the acreage, it is stated, would have been still greater in 1918. Flax is grown in almost every one of the thirty-three counties in Ireland, but mainly in six of the Ulster counties. In the North of Ireland, therefore, it is not a question of starting or reviving the industry so much as extending and developing an already existing industry.

The Committee, besides examining witnesses from Ireland, had the benefit of the report of a Committee appointed by the Irish Department of Agriculture and Technical Instruction in 1910, to enquire into the Irish flax-growing industry. Although previous to 1910, there had been for several decades a gradual decline in the area under flax in Ireland, the Departmental Committee was of opinion that the area was again on the up grade, and was convinced that in future flax growing in that country could be continued and extended. The Committee place on record its sense of the importance and value of the work done by the Irish Department of Agriculture and of the necessity of its being pushed on and considerably extended at the earliest possible moment. In addition to the efforts of the Irish Department of Agriculture to revive the industry in Ireland, private enterprise has taken up the question. The Flax Society, Limited, with the assistance of the Government, set on foot a scheme which had in 1918 about 10,000 acres under cultivation, mainly in the north of Ireland. The Fibre Corporation (Ireland), Limited, who also began work at first (some time before the war) in the north of Ireland, have extended their operations to the south, and had in 1918 an area of 800 acres under flax there.

Though flax growing is at present confined mainly to the north of Ireland, there appears to be no good reason why it should not be extended to other provinces where the soil, labour, and other conditions are suitable. A very great extension of the acreage outside of Ulster is possible, and already considerable expansion has taken place. In Cork the acreage increased from 209 acres in 1914, to 3,053 acres in 1918. In Mayo and Sligo the increase was from 241 acres in 1914, to 1,688 acres in 1918. Owing to the earlier season the south of Ireland is more suited climatically than the north for drying the straw and saving the seed, and one of the lessons of the war has been the importance of not relying entirely upon a foreign seed supply as has been done in the past. The Committee is anxious to secure the establishment in the south of Ireland of one or more flax-manufacturing units which will undertake the experiment of producing flax fibre on the factory system, as against the old system whereby the crop was handled by the farmer after pulling.

FLAX GROWING IN ENGLAND AND SCOTLAND.

For some years before the war the question of increased flax production in England had also been receiving consideration. In 1911, D. J. Vargas Eyre was requested by the Development Commissioners to enquire into the possibilities, both from a scientific and practical point of view, of reviving the flax industry. As a result of his report the British Flax and Hemp Growers' Society, Limited, was established in 1912 with a grant from, the Development Commissioners. About the same time Leeds University had taken the matter up and an experimental station was established at Selby. In 1917, these efforts were combined under one organization as the Flax Production Branch of the Board of Agriculture, which has work now going on in various parts of England and in Fifeshire. The following are figures of their acreage in 1918: — Somerset and Dorset, 3,450 acres; Yorkshire, 3,755 acres; Lincolnshire, 3,173 acres; Suffolk, 1,802 acres; Fifeshire, 1,357 acres; total, 13,537 acres.

In all these cases the work is being carried on in central retteries with all possible appliances for handling the crop in the most approved way. The results are being closely watched and will be of the greatest value for the future guidance of the industry. The Committee forwarded to the Board of Agriculture a strongly-worded resolution to the effect that the work of the Flax Production Branch should be continued and developed to the greatest possible extent in 1919, so that information may be obtained to guide it in deciding upon a policy for after-war development. As a result of this it was decided to extend the area in 1919, to 20,000 acres. In the meantime it may be sufficient to say that the work already done has proved conclusively that excellent flax can be grown in many parts of the country and that the problems still to be settled are mainly industrial and mechanical rather than agricultural.

SEED SUPPLY.

The Committee has been greatly impressed by the fact that in 1914, the flax growers of the United Kingdom were totally dependent for their supplies of seed upon Russia and Holland. Russia has been the original source of supply of all seed for fibre. The seed used in Ireland was partly imported direct from Russia and partly drawn from Holland as "Riga-child" or "Grandchild," after being cultivated one or two years there. The result of this dependence upon foreign sources of supply was experienced towards the close of 1916, when Ireland was faced with the prospect of a serious shortage of seed for 1917 sowings, and at the request of the Irish Department of Agriculture and Technical Instruction the War Department took charge of seed supply. Various emergency measures, including the organization of purchase in Russia and Holland on Government account, the establishment of special shipping arrangements, and the introduction of considerable quantities of Japanese seed were carried through by the War Department and the Flax Control Board, by whom the problem has been most efficiently handled, with the result that there

has been no very serious scarcity. The question, however, will not cease to be the cause of grave anxiety and considerable expense until a safe and satisfactory supply can be secured within the British Empire. The Committee is of opinion that this is a commercial possibility.

The fact that there was no native supply of seed in Ireland before the war was again due to the system of natural retting already referred to, which was universal in Ireland before the war. Owing to the short time available there was no time to remove the seed before retting; the seed, was, therefore sacrificed to the necessity of early harvesting, for the flax was generally pulled green before the seed had ripened. Thus in Ireland until 1917 practically the whole of the seed was lost, and a fresh supply had to be imported every year. This question of seed supply has so far proved to be the limiting factor in the development of an increased supply of fibre during the war.

Providing a Home Supply.

As a first step towards meeting this difficulty by the provision of a home supply, the Army Council in July, 1917, made an Order under the Defence of the Realm Regulations that the seed from not less than one-eighth of the crop must be saved, and this has already resulted in the provision of an amount of home-grown seed which has materially eased the situation. But the radical cure for the former state of affairs is more likely to be found in the general adoption of the system of central retting above described. Under that system the straw would be de-seeded before retting, and various machines for this purpose have already been invented. The Fibre Corporation adopted this method, and some of the seed thus saved in the early years was used in Ireland in 1917, and proved exceedingly useful. The question of seed supply, however, turns upon another point of scientific difficulty, namely, the suitability of different varieties of flax seed for growing for fibre purposes. There seems to be two well-marked varieties of the flax plant, botanically the same, and practically indistinguishable in the seed. The one grows about 18 inches high, is much branched, and carries a heavy crop of seed. It is generally sown widely so as to allow of ample branching. The other, if sown thickly, grows unbranched to a height of about three feet, and carries comparatively little seed. The former variety is grown for linseed only, in the Argentine and elsewhere, and it has not hitherto been found possible to extract any useful fibre from it. The latter variety is cultivated exclusively in all countries where flax is grown for its fibre.

Seed Production in Canada.

Steps were taken by the War Department during the summer of 1918, to induce farmers in Canada to take up the growing of flax for seed on a large scale. A contract was entered into with Messrs. E. R. Wayland and Co., of Winnipeg, who undertook to distribute to the farmers Japanese seed provided by the Government, to superintend the growing of the crop, and finally to arrange delivery of the seed at the Atlantic ports. In 1918, 30,000 acres were sown in this way, and the results obtained were very satisfactory in spite of a bad season. The Committee has recommended that the contract with Messrs. Wayland and Co., should be continued on a smaller scale for the year 1919, and feels sure that some scheme of this kind will be necessary to secure an adequate seed supply, at any rate, so long as the present disturbed condition in Russia continues.

The scientific question of how far the character of the seed may be affected by the way in which it is sown, if persisted in year after year, still remains to be settled. It appears that flax is a soft fertilised plant, and it is difficult to believe that its character could change permanently in the way indicated, but there seems to be room for considerable further enquiry into the matter.

Flax Growing in the Empire, Canada.

In Canada flax has always been grown for fibre purposes on a relatively small scale in the Eastern Provinces, especially Ontario. Efforts made in 1917 and 1918 to increase the area under fibre flax in Eastern Canada have met with considerable success, and the area in 1918 amounted to 13,000 acres. In Western Canada the problem was to induce the growers to use the imported Japanese seed (in place of the Canadian common which they have hitherto grown for linseed only) for the purpose of producing fibre seed for use in other parts of the Empire, such as Eastern Canada and the United Kingdom.

Another question of direct economic interest is the possibility of utilising the linseed straw in Western Canada, which though essentially it is the same plant as fibre flax, has so far been found useless, and is mostly burnt. Any use that could be established for this by-product which would increase even to a moderate extent the total money yield of the crop to the farmer, would be a very important factor in extending the cultivation of flax for seed purposes throughout larger areas in Canada.

Africa.

The evidence taken goes to show that in the higher portions of British East Africa the conditions of climate and soil are entirely suitable to the growing

of flax, which has already been carried on upon an experimental scale for several years. It was stated in evidence that 5,000 acres were put under flax in 1918, that this would probably be greatly expanded in 1919, and it is estimated that the area might be increased to 100,000 acres in ten years. The labour supply appears to present comparatively little difficulty, the natives having shown an unexpected capacity to acquire the necessary skill in working the scutching machinery, and the industry seems to be established on a safe basis. The Committee, therefore, addressed to the Colonial Office, through the President of the Board of Trade, a strong recommendation that every possible assistance should be given to secure the speedy extention of the industry. The Committee felt in particular that there is need of expert assistance in British East Africa in the preparation of flax for the market. It is essential, for the success of the industry in the Protectorate, that its flax should be thoroughly reliable, and that its marks should be recognised in the markets. To secure this it is necessary not only that the flax should be properly handled after it has been pulled, but that the fibre should be properly graded.

A scheme has been laid before the Committee for the extension of flax production by means of settlements of disabled soldiers in British East Africa. The scheme was forwarded to the President of the Board of Trade for transmission to the proper authorities, with the Committee's recommendation and approval, so far as flax production is concerned.

In other parts of Africa, *e.g.*, Egypt, Nyasaland, Rhodesia, and South Africa, the industry seems to present possibilities of success, though it has not yet passed the experimental stage, but the Committee have not yet gone fully into the situation in these countries.

AUSTRALASIA.

With regard to Australia also, the Committee has received certain information which points to the conclusion that flax can be grown successfully there on a large scale if the economic conditions of the crop are likely to offer sufficient inducement, but so far it has only had the evidence of one witness on the subject, and until this has been supplemented by further information it prefers to defer any references to the matter. The same applies to New Zealand.

INDIA.

With regard to India, the Committee has heard evidence regarding experiments in flax growing which were made some years ago in Bihar, and has received reports of experimental work carried on in other parts of India. The results show that flax can be successfully grown. Here, as elsewhere, there is little doubt that the system of central retting would be necessary to obtain the best results. This, however, necessitates skilled labour and supervision. Unquestionably the successful development of the industry would also depend upon the services of an expert who would supervise the handling of the crop after it has been gathered and its proper preparation and grading for the market.

DEVELOPMENT IN THE EMPIRE.

To sum up, the position with regard to the future development of these flax fields with the British Empire may be put as follows:—

In all of them it has been demonstrated that flax can be successfully grown, and the question is simply whether, in view of the economic conditions of the crop, it is likely to be a success, not merely under the present abnormal conditions created by the war, but under whatever conditions may finally be established as normal after the war. It is very probable that, at least in certain cases, the possibilities of these areas may be so clearly demonstrated, and the industry so firmly established while flax is still at or near its present abnormal level of prices, that these new areas will be able to carry on the production of flax on a large scale under whatever conditions may arise later on, and so provide the Empire with a permanent supply of the raw material within its own bounds.

RECOMMENDATIONS.

The Committee make the following recommendations:—

1. It is undesirable that an industry so important as the British Linen Trade should remain largely dependent upon external sources of supply for its raw material, especially as the industry has proved to be indispensable in war time,

2. The efforts made by the Government under the necessity of abnormal war conditions to foster the revival of flax growing in the United Kingdom and to extend its cultivation within the Empire have achieved a considerable measure of success, and it is essential that these efforts should be continued until full value has been derived from them.

GREAT BRITAIN.

3. (*a*) The efforts made under the stress of war conditions to revive flax growing in England and Scotland have been essentially experimental in their character, the main point being to determine whether under modern conditions, including the use of machinery and the central retting process, it is possible to re-establish the industry on a large scale and on a sound economic basis. In Great Britain it is desirable that this work should be continued until sufficient data are accumulated to provide a definite answer to this question.

3. (*b*) In the event of the result of these experiments being unfavourable to the continuance of the English and Scottish schemes on an economic basis the question will still remain whether part of the area and of the establishment should be retained for further experimental purposes on the lines of purely scientific research.

3. (*c*) Research should be undertaken into the possibilities of further mechanical improvements in the means of cultivating and handling flax.

IRELAND.

4. (a) The Department of Agriculture and Technical Instruction should at once take steps to develop and extend their existing schemes for the encouragement of flax growing in Ireland, and for this purpose they should be provided with funds to enable them :—

(1) To provide further instruction in the cultivation and handling of the crop, and to devote special attention to the new districts where instruction is most needed.

(2) To continue and extend their investigations into the selection, improvement and supply of the varieties of seed best suited to Irish conditions, and other questions affecting the growing of flax in Ireland.

(3) To make permanent provision for the training of instructors and scutchers.

(4) To give loans for the erection of new, and for the repair and extension of existing, scutchmills.

NORTH OF IRELAND.

4. (*b*) The work of the Flax Society may also be regarded as mainly an experiment directed to the same problem as that of the English and Scottish schemes, and should in the same way be continued for such time as is necessary to secure its full experimental value.

SOUTH OF IRELAND.

4. (c) It is of the first importance that an experiment should be made on a sufficiently large scale to test the feasibility of reviving the flax-growing industry in the South of Ireland on factory lines, and for this purpose at least two units of the area of 1,000 acres each should be established in the South, as already recommended by the Committee.

CANADA.

5. The scheme for the supply of fibre seed from Western Canada should be continued until such a time as, owing to the return of normal conditions or the development of other sources of supply, the question of seed supply for the United Kingdom is put on a permanently satisfactory basis.

BRITISH EAST AFRICA.

6. (*a*) The results already achieved in British East Africa warrant the hope that success in this area is likely to be permanent. That nothing may be lacking on the part of the authorities to ensure this success, we recommend :—

(1) The provision at central points of machinery for the treatment of flax;

(2) The development of agricultural research and experiment in flax production in the Protectorate by such means as after suitable investigation the local Department of Agriculture may suggest ; and

(3) The provision of expert assistance in the preparation and grading of flax for the market.

6. (*b*) The scheme for the settlement of slightly disabled soldiers in British East Africa should be adopted, and if successful should be made the first of other schemes for the settling of soldiers in this colony, where the conditions seem to be peculiarly favourable to the production of flax.

VERNACULAR EDUCATION IN CEYLON.

Reasons for Success.

In concluding a bulletin issued by the Bureau of Education, India, entitled "*Notes on Vernacular Education, in Ceylon*," Mr. H. Sharp, C.I.E., Educational Commissioner with the Government of India (who recently visited Ceylon) writes as follows:—

It has already been pointed out that the percentage to the population of those who attend school in Ceylon is just three times what is in India. The percentage of literacy for males is 40·4 and for females 10·6, against 10·6 and 1·0, respectively in India. The visitor who is acquainted with Indian village conditions will be impressed in Ceylon by the wholesale way in which things are done and also by the excellence of the education imparted. He will be thinking of the small, dark building, stuffy in summer and sunless in winter, with its fifty pupils mainly crowded together in the infant classes, which so often represents the educational centre of an Indian village; and he will contrast it with these open school rooms, spacious and airy, with anything from 100 to 1,000 pupils divided into well-proportioned classes, each with its teacher and monitor. The

school in Ceylon is alive and things go with a business-like energy which s too frequently lacking among the stagnant lower-classes which overload Indian institutions. There are reasons for this contrast; and when we consider them, it is only fair to bear in mind that India too can show many admirable elementary schools—indeed, whole tracts where such schools abound. The contrast is between the average institutions found in the two countries.

Wealth of the Island.

The natural wealth of the Island is a potent factor among these causes. It permits of a reasonable expenditure upon education and of the retention of the children at school beyond the age when they become useful for agricultural or other work. The ancient stories of this "land of the ruby and the hyacinth" are no myth and are as true now as in the days of the Greek writers. Tea, rubber, plumbago, cocoa, the arecanut, cinnamon and above all, the cocoanut and its products, to say nothing of precious stones, constitute an unfailing mine of riches. Here the cultivator is, indeed, blessed: the earth pours out for him an easy livelihood and a few acres of cocoanut palms bring him a solid monthly income.[1] There is no income-tax, no land revenue. Indeed, the only form of direct taxation is a poll-tax, of Rs. 5·0 a year on all males between 18 and 55 years of age. The revenue is derived from customs, the railway and other such sources. The annual value of exports is £3·6 per head of the population against £0·53 in India. The revenue is £1·1 per head against £0·37 in India.

Thus Ceylon is in a position to afford a good educational system. The expenditure on education from public funds per head of the population is more than double that in India. And yet this result is accomplished by the allotment to education of a smaller percentage of the public revenue Ceylon spends 3·5 per cent of her public revenue on education. India spends 4·3.

Then again there is the Ordinance which it is easy to enforce with reasonable strictness because of the abundance of educational facilities and the general desire on the part of the people for instruction. The wealth of the island and the advanced state of civilisation to which most of its inhabitants have arrived rendered education popular. Caste and "purda" are of minor importance. Sinhalese girls come readily to school. This fact radically affects the attitude of the people towards education; the literate mother regards literacy as the rightful heritage of her offspring. The only extensive area in India which can compare in the matter of education with Ceylon is Burma, which also is mainly a Buddhist country. In Burma 37·6 per cent of the male population and 6·1 of the female are literate.

Westernising Influences.

Westernising influences have been strong in the Island, and, without breaking down the national characteristic, have left their marks in many ways upon the life of the people. The missionary element is potent and adds considerably to the educational assets of the Island. The European element in the population is substantial and (including Burghers and Eurasions) amounts to 9 per cent. No less than 0·8 per cent of the population are enrolled in English schools. The number of males literate in English in 1911 was three and a half times the corresponding figure in India and the number of female was twelve times. In some of its aspects Ceylon appears to have parted from the habits of the immemorial East and to have adopted European ways and requirements.

Again, vernacular education in Ceylon is worth having, not only because the people feel the need of it, but also because it is good. The teachers are reasonably paid. Training, though by no means universal, is thorough. The head-master is alert and takes pride in his school. Control is effective. Much of the education is imported in government schools, which are sufficiently numerous to set a high standard. Inspection is adequate. For a population which is not larger than that of some Indian districts there are a Director of Education and an Assistant Director; there are three Inspectors, one Inspectress, an Inspectress of drawing and an Inspectress of needle work—all Europeans, who tour throughout the Island; there are five Inspectors of English schools, with territorial jurisdiction; and there are thirty sub-Inspectors. An Indian district has on the average one-third of the services of a single Inspector, one-third of these of an assistant Inspector, one deputy Inspector and half the services of a similar officer, and four sub-Inspectors or officers of like grade. For a district containing four millions of people, the allowance of Inspecting officers would ordinarily be larger than this—possibly three times as large. But, even so, the contrast is remarkable.

Such, so far as I could ascertain, are the reasons which render compulsory education a fairly easy problem in Ceylon and which keep the instruction at a high level. The natural advantages of the country are its own and cannot be artificially reproduced elsewhere. But perhaps these few notes may be found to contain some suggestions not altogether inapplicable to India.

[1] I was informed that an acre of cocoanut gives R 0 a month, *i.e.*, *from the mere sale of the produce.* Others told me that this was only in the richer parts of the Island, but admitted that return was large even elsewhere. Such calculations made no reckoning of the further return from the manufacture of oil cake and copra, with which the cultivation has nothing ...

ECONOMIC NOTES.

EDUCATION.

Weaving Schools in the Bengal Presidency.

In the Bengal Legislative Council, some time ago the Hon'ble Mr. O'Malley sketched briefly the existing organization for instruction in up-to-date methods of weaving, and stated what action Government propose to take in order to give further instruction and to help to resuscitate the industry. The Hon'ble Member said :—

"We have already at Serampore the Government Weaving Institute where instruction is given to two distinct classes, the first consisting of young men of good education who are likely to qualify as teachers, overseers, managers—in fact, young men who are likely to be organizers of the industry. The second class consists of those who are themselves weavers and their sons. The institute also serves as a centre from which instruction is given to weavers through schools of weaving which have been established in different centres of the industry. In Calcutta there are some weaving schools, their being two weaving schools at Cox's Bazaar and at Tangail. There is also one in Malda and one in Pabna in Northern Bengal, and one at Bankura in West Bengal. Not only do young men receive training in these weaving schools as well as at the Weaving Institute at Serampore, but Government help them to set up business when they pass through their course, and give them advances for the purchase of looms and other accessories. In spite of this it is recognised that the use of the fly-shuttle loom and the adoption of up-to-date methods of weaving have not spread as fast as could be desired. It seems that the introduction and spread of up-to-date looms and up-to-date methods through the villages cannot be given full effect to by means of weaving schools at fixed centres. A scheme has therefore been prepared for peripatetic instructors who will go about the villages, demonstrating the use of the fly-shuttle looms to the weavers themselves instructing them in preparing their yarn before the actual process of weaving is begun, and also assisting in creating weavers co-operative societies. It is hoped that these instructors will succeed in getting fly-shuttle looms adopted more rapidly than at present, and that they will help to create a greater demand for instruction in modern methods. If this is the case, the attendance in weaving schools will rise, and the number of schools will have to be increased. One such peripatetic instructor has already been appointed in the Burdwan district, and there has already been a fair amount of success; a certain number of fly-shuttle looms have been bought by the weavers, and they are earning their livelihood. The Principal of the Serampore Weaving Institute is anxious to extend the system, and has proposed that four more peripatetic instructors should be attached to the weaving schools at Tangail, Malda, Bankura and Pabna, as the managing committees of all these schools are very anxious to have peripatetic instructors. Besides that, the Principal proposes that peripatetic instructors should be employed in districts in which no weaving schools are establisbed. I think it will be recognised that this arrangement has a certain advantage, namely, that the villagers will be reached more easily than if there is a weaving school at a fixed centre. Again, in the districts in which we already have weaving schools, the work done by the schools will be brought home to the weavers, and I think the knowledge of the modern methods will be more easily disseminated in the way."

EDUCATION IN TRAVANCORE.

The following Proceedings of the Government of His Highness the Maharaja of Travancore have been issued :—

The Director of Public Instruction has forwarded, for the consideration of Government, certain proposals of the Deputy Director of Public Instruction relating to the revision of the curricula of studies in Vernacular Schools. The Deputy Director thinks that the curricula of studies now in force in these schools are defective in several respects and suggests that English and Sanskrit may be made compulsory subjects of study and that subjects of practical utility may be more largely and systematically taught than at present. The Deputy Director is also of opinion that, in view of the marked expansion and development of Vernacular education in recent years, a syllabus prepared on the most practical and up-to-date lines has become a desideratum and that the formation of a Committee for considering the whole question fully and arriving at a definite decision should not be postponed.

The Government of His Highness the Maharaja have carefully considered the proposals of the Deputy Director of Public Instruction and they generally agree with him in the view that the curricula of studies now in force in Vernacular Schools

call for thorough and immediate revision. The outstanding defect in the existing course in Vernacular Schools which was introduced with the Education Code in 1085 M. E. is that it is far too literary and that it overlooks the practical, vocational side. It is essential that this defect should be remedied, as far as possible, in the best interests of the pupils passing through the portals of Vernacular Schools. It is also necessary that attention should be paid to the physical culture of the pupils. Government propose to deal with Vernacular education for boys in the first instance. The proposals regarding the changes to be introduced in the curricula of studies in Girl's Schools have not yet been received from the Director of Public Instruction, and action will be taken in the matter after the receipt of these proposals. Vernacular education should aim at not only imparting general knowledge, but also teaching a profession or industry which would enable those who successfully pass through the course to earn their bread independently of public service. For formulating practical proposals regarding the revision of the course of studies in Vernacular Schools for Boys so as to suit modern conditions and to secure the maximum material benefit to the pupils attending these schools, and for considering such correlated subjects as the reclassification of schools, the qualification of teachers, and the number and nature of text-books to be introduced consequent on the revision of the course, His Highness' Government resolve to appoint a Committee consisting of Officials and Non-officials as below:

OFFICIAL MEMBERS.

(1) Mr. P. Ramaswami Aiyer, B.A., Deputy Director of Public Instruction—Chairman.

(2) Mr. I. C. Chacko, B. A., B. Sc., State Geologist.

(3) Dr. N. Kunjen Pillai, M.A., D.Sc., Director of Agriculture and Fisheries.

(4) Mr. S. Parameswara Aiyer, M.A., B.L., Acting Under Secretary to Government.

(5) Mr. A. Gopala Menon, M.A., Assistant Professor of History, His Highness the Maharaja's College, Trivandrum.

(6) Mr. A. Narayana Aiyar, B.A., L.T., Headmaster, Higher Grade English School, Trivandrum—to be also Secretary.

(7) Miss D. H. Watts, B.A, Lady Principal, His Highness the Maharaja's College for Girls, Trivandrum.

NON-OFFICIAL MEMBERS.

(1) Mr. K. C. Mamman Mapillai, B.A., Editor, the Malayala Manorama, Alleppey.

(2) Mr. N. Kumaran Asan, Adwaitasramam, Alwaye.

(3) Mr. R. P. Kulandaswami Pillai, B.A., L.T., Head-master, St. Joseph's Higher Grade English School, Trivandrum.

(4) Mr. C. Raman Tampi, B.A., B.L., High Court Vakil, Quilon.

The following details relating to the new Vernacular School Leaving Examination will also be referred to the Committee for report :—

(1) What should be the subjects, compulsory and optional, for the proposed examination, and what should be the minimum number of marks in each subjects or group of subjects, as the case may be, for a pass;

(2) whether any progress register should be maintained, and if so in what form; and

(3) what should be the form of the certificate to be awarded to the successful candidates.

The Committee should hold their preliminary meeting in Trivandrum *at once* and settle their programme of work. The Victoria Jubilee Town Hall will be placed at their disposal for their meetings. A period of six months is allowed to the Committee for their deliberations, at the end of which they should forward their report to the Director of Public Instruction, who will forward the same to Government with his own remarks thereon. The Non-official Members of the Committee will be given mileage at the rate of (14) fourteen chackrams and daily allowance at the rate of Rs. (5) five for all journeys that may be undertaken by them in their capacity as members of the Committee. The official Members including the Chairman will be paid the usual rates of travelling allowance for which they are eligible under the Service Regulations.

REVISION OF EXPENDITURE.

The subjoined statement shows the gross outlay, the receipts, and the net expenditure under education during the ten years ending with 1093 M.E.

Year.	Gross expenditure.	Receipts.	Net expenditure.
Rs.	Rs.	Rs.	Rs.
1084	7,41,764	1,73,729	5,79,606
1085	7,60,364	1,71,410	5,88,954
1086	7,95,713	1,72,584	6,23,129
1087	9,55,951	2,06,131	7,49,820
1088	12,84,450	2,56,581	10,27,869
1089	15,89,080	3,06,503	12,82,577
1090	18,53,540	3,86,921	14,66,619
1091	20,03,352	4,34,113	15,69,239
1092	20,65,254	4,86,721	15,78,533
1093	22,21,674	5,65,343	16,56,331

The gross expenditure rose from Rs. 7·41 lacs in 1084 to Rs. 22·21 lacs in 1093, or by 200 per cent nearly during the decennium under review. The exact figures for 1094 are not yet available. But the revised estimate is Rs. 23·39 lacs, against a budget grant of Rs. 23·91 lacs while the expenditure estimated for 1095 M. E. is Rs. 26 lacs. It is evident from the foregoing figures that the growth of expenditure under 'education' has been rapid and substantial. The total expenditure is now about 15 per cent of the total revenue of the State. This expenditure does not include the outlay on the construction and maintenance of educational buildings, which is being charged to the P. W. D. Though, under receipts, there has been no substantial increase during the period, yet it covers not more than 25·5 per cent of the gross expenditure, and the direct receipts from education are hardly capable of much further expansion. Notwithstanding the large outlay on education year after year in all its branches, the demand for more schools, for higher classes in existing schools, and for a larger number of teachers has still to be met. Again funds have to be found for the improvement of the material condition of the teachers in Vernacular Schools, for the development of technical and industrial education, for the expansion of female education and the education of particular classes, and for a variety of other important matters which are bound to come up for solution with the new angle of vision in regard to educational ideals. At the same time, it has to be recognised that it will not be possible to add indefinitely to the budget grant already sanctioned for education from the general revenues without seriously handicapping the other departments of the State. His Highness' Government therefore consider that the time has now arrived for reviewing the expenditure under education and for devising measures, which without adding substantially to the existing grants from the State Revenue, will set free funds for educational development on modern lines. To consider this question, Government resolve to appoint a Committee as below :—

OFFICIAL MEMBERS.

Mr. K. George, Financial Secretary to Government. (Convener).

Mr. J. Pryde, Inspector of English Schools.

Mr. P. Ramaswamy Aiyer, Deputy Director of Public Instruction.

Miss. E. C. Carrapiett, Inspectress of Girl's Schools.

Mr. N. Krishnaswami Aiyer, B.T., Professor of Chemistry, His Highness the Maharaja's College.

NON-OFFICIAL MEMBERS.

The Ven'ble Archdeacon J. J. B. Palmer, Kottayam.

Mr. T. Kumara Pillai, Member, S. M. P. A., Kalkulam.

Mr. P. K. Kesava Pillai, B.A., B.L., High Court Vakil, Trivandrum.

Mr. C. P. Thomas, B.A., L.T., Head-master, M. T. Seminary, Kottayam.

The Committee will report on the following specific points :—

(a) whether, and if so, how the expenditure now incurred under education could be revised with a view to eliminate all avoidable expenditure ;

(b) whether it is not feasible and necessary to invest local bodies with the entire responsibility for Lower Grade Vernacular Education with a contribution from State funds ; and, if so, how this should be done and what grant should be made from Government, it being clearly understood that inspectional control will rest with the Department; and

(c) whether, and if so, what changes should be made in the present system of grant-in-aid to private schools.

The report of the Committee should be in the hands of Government before the close of Makaram 1095. The report should be forwarded through the Director of Public Instruction who will submit it to Government with his own remarks. The Committee will meet in the office of the Financial Secretary to Government. The Non-official Members of the Committee will be paid mileage at chuckrams (14) fourteen & daily allowance at Rs. (5) five for all journeys undertaken by them in their capacity as members of the Committee. The Official Members will be paid usual rates of travelling allowance for which they are eligible under the Travancore Service Regulations.

AGRICULTURE.

Cocoanut Industry in Malaya and its future prospects.

According to the report of the Standing Committee of the Planters' Association of Malaya, presented at the twelth annual general meeting on April 30th, the area under cocoanuts on estates of over 100 acres was given at the end of 1917 as being over 100,000 acres for the whole of Malaya. The area in smaller holdings is uncertain, but may be approximated at from 100,000 to 125,000 acres, giving a total of from 200,000 to 225,000 acres at the end of 1917.

In the absence of definite figures we may record the opinion that the amount of new plantings is small, and would, perhaps, about balance the areas of unprofitable cocoanuts that have been cut out, or abandoned during the year. The acreage at the end of 1918, therefore, may be taken as being about what it was at the end of 1917, with the remark that most of the new planting has been done on land shown by experience to be suitable to the profitable cultivation of cocoanuts; whereas most of the reduction of area has been where the cocoanuts were under unsuitable conditions.

The price of copra during the year ruled from $ 6 to $ 11 per picul, compared with $ 4.50 to $ 8.50 last year. Prices improved steadily throughout the year, and the prospect is that higher prices will be maintained during 1919.

Cocoanut growing with the production of copra as its end point, runs on a very narrow margin of profit per acre; and this fact, together with the difficulty of establishing a plantation, and its high cost of upkeep, have tended to check rapid extensions of the industry.

However, in view of the shortage of edible oils throughout the world, and the suitability of cocoanut oil for edible purposes, there is a strong probability that the cocoanut plantations will find it profitable to discontinue the sale of copra for export, and either co-operatively or otherwise, produce and export, cocoanut oil of an edible grade. In fact, some progress has been made towards this end.

An object lesson in cocoanut development in the Phillipines has attracted considerable attention locally. In 1912, the Phillipines exported 169,000 metric tons of copra, and almost no cocoanut oil. In 1912, modern oil mills were established. In 1913, the export of cocoanut oil came to 1,300 metric tons, By 1916 it was 16,000 metric tons; and in 1918, over 100,000, metric tons of cocoanut oil were shipped. The value of 100,000 tons of cocoanut oil is £ 6,000,000.

INDUSTRIES AND COMMERCE.

A New Hydro-electric Plant in Burma.

The following particulars of a new hydro-electric plant installed at the Kaubauk Mine in Burma appeared in *Capital* of Calcutta.

It is the first of its kind to be erected in the district, and the opening ceremony marked the completion of an important step in making use of Burma's natural resources. Kaubauk is distant about sixty miles from Tavoy town, and from the point of view of the company owning the mine the scheme is important because it provides them with power which renders possible the successful and profitable exploitation of the alluvial deposits that exist in the Tavoy district. But it has a wider importance than the purely local aspect, as it furnishes to the wolfram industry in particular, and to the province in general, an incentive to make use of the natural resources so abundantly granted to Burma. About three miles to the southward of the town of Kaubauk, and on the top of the hills which rise to a height of 3,000 feet, is a natural horse-shoe shaped valley, and across the heel of it has been built a stone dam, resting on a solid granite foundation, which impounds a reservoir which stores five hundred millions of gallons of water. The greatest care has been bestowed upon the construction of this dam. On the face of the dam is an apron of reinforced concrete, fourteen inches thick at the base, reduced to eight inches at the top. The by-wash of the water flows over a ledge of solid granite cut into the side of the hill at the eastern extremity of the dam. About three miles of pipe convey the water to the power-house, built on the edge of the mine at Kaubauk, and the last portion of this pipe drops nearly perpendicularly some eighteen hundred feet. The available energy of this pipe of water is 1,000 brake horse-power, but for the dynamo so far installed only half this power is being utilized. The head of water at the power-house is 2,094 feet, a height only excelled in a few plants in Switzerland and the United States of

America. The electric energy now being made operates the machinery on a pump dredge and uses up 400 horse-power. On the dredge is a motar-pump operating a monitor which breaks down and sluices the ground containing the alluvial deposits of ore, whilst the electrically-driven gravel pump elevates the broken ground to the sluice-boxes in which the ores are separated, leaving the tailings to be washed away and heaped up behind the dredge. The capacity of the dredge is 30,000 cubic yards per month. Part of the balance of the electric power is used in driving the ten stamp battery which crushes the ore obtained from the reefs in the hills.

EMPIRE SUGAR PRODUCTION.

In the Preliminary Report of the Empire Sugar Supply (Technical) Committee, submitted by Mr. Arthur R. Ling on July 16, at the annual meeting of the Society of Chemical Industry, over which Lord Denbigh presided, there are some interesting facts given regarding sugar production in India and the Near East.

Of India the report states that it was at one time the largest producer of sugar of any country in the world, but so far as statistics show at the present time it occupies a second place in the list, Cuba coming first. However, it must not be forgotten that statistics in British India are by no means complete, whilst those of the Indian states are still less so; consequently, much of the sugar which is produced and consumed by the Indians is unrecorded. The area under sugar-cane and sugar-yielding palms for the season 1916-1917 was estimated to be as follows:—Sugar-cane, 2,437,000 acres; palms, 175,000 acres. The cane was estimated to produce 2,626,000 tons of gur, and the palms 400,000 tons of gur, a yield of 0·92 tons and 2·28 tons per acre, respectively. These figures have, however, little significance, for the present. Small holdings will have to be converted into centralised estates if any real improvements are to be effected in India as regards increasing the yield and quality of the sugar. With regard to the future development of sugar cultivation in Ceylon, it may be said that fully two-thirds of the island receives less than 75 inches of rain per annum, and the cultivation could only be carried out in the dry area with irrigation, especially when it is remembered that the greater part of the rainfall falls within the months of the north-east monsoon season. Of Cyprus the report states that up to the middle of the sixteenth century it was one of the principal producers in the Levant of cane sugar, but no attempt has been made in recent years to revive the industry. It is believed, however, that beet could be successfully grown in the island, and within the last year or so inquiries have been made from two different sources as to whether the Government could grant monopolies for the manufacture in the island of sugar (*a*) from beet, and (*b*) the carob bean. In regard to Egypt, there is no suitable land available for the extension of the sugar industry, but, should the remaining basins of Upper Egypt be converted to perennial irrigation, a considerable area will be available. From the Sudan no information has been received, but it appears that, with irrigation, there should be a possibility of establishing a sugar industry.

MANUFACTURE OF PAPER FROM BAMBOO IN TRINIDAD.

We take the following from the *Society of Arts Journal*:—

An important project for manufacturing paper from bamboo in Trinidad is being carried out by an Edinburgh firm of publishers. About 1,000 acres of land near St. Joseph (seven miles from the Capital at Port of Spain) have been planted in bamboo, and a concession has been obtained giving the firm the right to cut bamboo from the Government forests.

According to report by the United States Consul in Trinidad, the firm in question, foreseeing a paper famine throughout the world within the next few years, have been giving serious consideration to the problem of providing adequate paper reserves for themselves for the future; and although realizing that paper can be produced from any vegetable material containing cellulose, nevertheless came to the conclusion that bamboo was most suitable for the purpose. They selected Trinidad for their bamboo paper project, as the bamboo grows there very quickly, having sufficient development within three or four years for making paper.

Experts have been employed to study the question of easily getting rid of the knots in the bamboo, and also of the yellowish-green colour that has hitherto been considered a drawback for the manufacture of

paper from bamboo. The first experiments in Trinidad with the bamboo consisted of putting the reeds through sugar-cane presses. While this rather crudely accomplished the purpose, nevertheless, it was found to be desirable that the bamboo should be shredded as well as mashed, and the knots removed. It is said that a machine has been designed which accomplishes all this work, and that a bleach or a dye has been discovered which makes the pulp wood and paper perfectly white. It is understood that the machinery for the bamboo plant, to cost about £30,000, has been ordered from the United States.

INDIAN INSTITUTE OF SCIENCE.

Past Year's Industrial Researches.

The tenth annual report, that for 1918-19, of the Institute of Science, Bangalore, just issued, is an interesting record of researches made for industrial purposes.

As regards investigations made in the institute, in the department of general and organic chemistry, Mr. M. N. Mehta, M. A., B. Sc., a graduate of the Bombay University, was engaged, with the help and under the guidance of Dr. Sudborough, in an investigation into the deterioration of paper. This question has been taken up at the request of the Government of India. An examination of certain perished books has been made and proves that paper made from rags does deteriorate, although this has been denied by certain cellulose experts. The question is one of vital importance to India as it is found that paper in many books dating from 1820 show distinct indication of perishing. Many other important investigations were carried out by the department, the subjects including essential oils, wood distillation, the manufacture of glycerine, and experiments for the production of white lead and for the extraction of caffeine. In the department of applied chemistry under Dr. Gilbert J. Fowler, researches were made regarding the Mahua industry, indigenous dyes and varnishes. Considerable progress has been made in conjunction with a Bombay firm in the preparation of a detailed scheme for the production of gelatine on a manufacturing scale. The purification of water was another subject which engaged Dr. Fowler's attention. Brief results of his observations in Shanghai and Hankow, where he was invited last year to advise the municipalities on urged problems connected with the water-supply and sewage, are recorded in the appendix to the report.

Among other things an important series of tests of Indian timbers for the Indian Munitions Board for aircraft purposes have been carried out by Mr. Khan.

MOTOR INDUSTRY IN INDIA.

A fine opportunity would seem to be open now for the development of an Indian motor industry. How during the war the motor trade in India has been captured by the United States of America will be seen from the following statement and figures, culled from the latest 'Review of the Trade of India':—

"Ninety-five per cent of the total number imported came from the United States as against 37 per cent in the previous year. The interesting feature was the considerable decrease in the number of cars imported from the United Kingdom. Only 39 cars came from England, as against 449 in the previous year and 1,669 in the pre-war year 1913-14. The year was certainly, like its two predecessors, the year of the American motor cars in India."

Referring to this complete capture of the Indian motor trade by United States, *Business* says:—

"Unless something unforeseen happens, it is difficult to see how the supremacy of America in the motor trade of the world can be seriously challenged. There are only two possible ways of challenging her. Either we must beat her at her own game, and produce standardised machinery superior to hers, or we must find cheap labour. In England the only hope lies in standardisation. Why should not India try to utilise her cheap labour? The present Industrial situation in Europe seems to point the opening to India. Her labour, if properly employed, and assisted by a really sound capital outlay, such as that of the Tata works, seems to offer us the only possibility of retaining that industrial supremacy which the Empire requires. I should advise anyone to put money into a sound motor industry started in India, and I feel certain that some of the readers of *Business*, who have money to spare, would be amply rewarded by starting such a venture. If they combined standardisation with Indian labour, they should be able to produce an article which would capture the markets not only of the East but of the West.

JAPANESE PAPER YARN.

A Reviving Industry.

A Correspondent writes to the "Times Trade Supplement":--

At the moment paper yarn is probably of most interest from the point of view of its employment in the weaving of certain kinds of fabrics, mainly those used for making bags and packing cloth, until supplies of raw cotton and jute are increased to a quantity more nearly adequate to the world's demands.

In Japan paper cloth is no new thing, but during the war its manufacture, from paper yarn or from raw fibres used in paper making, has shown a progressive tendency. Formerly a kind of paper cloth was made and used in Japan as a substitute for cotton and silk fabrics for clothing. The paper yarn which has been made in Europe during the war, mostly in Germany and Austria, is made chiefly from chemical wood pulp, but Japanese paper yarn is made from a much tougher paper in the manufacture of which the inner fibrous bark of the paper mulberry and other trees having a fibrous bark is used. In a fabric known as Shi-fu the warp consists of silk and the weft of paper yarn. Fifty years ago Shifu fabric was very popular in Japan for women's summer clothing. Later, when the finer and more durable cotton fabrics began to be imported in large quantities and at low prices, the industry declined.

From the oldest times the fibrous bark of the paper mulberry (*Broussonetia papyrifera*) the gampi (*wickstrawmia* sp)., and *Edgeworthia papyrifera* have been used in making Japanese paper, and the fibres of these three plants are the strongest known for the purpose. Gampi cloth is well-known in Japan.

In the manufacture of paper yarn in Japan the paper manufactured from the fibres of *Edgeworthia papyrifera*, being fine, elastic, and of glossy appearance, is chiefly used. In external appearance Japanese paper yarn resembles linen yarn rather than cotton. Its most important uses are for weaving the cloth used for wrapping wool, silk yarns, and similar goods, and as the woof of material for belting, neckties, etc.

If the shortage of raw cotton continues, an increase in the Japanese production of paper cloth may help the situation to a slight extent.

PUBLIC HEALTH AND SANITATION.

Fleas and Scarlet Fever.

Dr. Hamer, the School Medical Officer for London, has, during many years, compiled comparative statistics of the relationship in the Metropolis of scarlet fever prevalence and flea prevalence. This year he returns to the subject in his annual report, and affords some very striking tables covering the past nine years.

The flea prevalence was estimated from the number of children found to be flea-bitten and from the number of beds in the common lodging-houses found to be flea-marked. The year 1910 showed a small augmentation of flea prevalence and also a small increase in the scarlet fever cases. In 1911 both fleas and fever were in abeyance. Again there was a small increase in both in 1912, this being confined to children aged only five years. Then the fleas began to increase markedly, and 1913, 1914 and 1915 were big "flea years." They were also big scarlet fever years. After that, in 1917 and 1918, the fleas fell away, and so also did the fever. The theory is attractive therefore. But objections have been brought against it. It has been pointed out, for example, that scarlet fever is by no means confined to dirty houses or dirty people. It has even been described as a disease of the well-to-do. This argument Dr. Hamer meets to some extent. He points out that so far as very young children are concerned scarlet fever is much more prevalent among the very poor. In older children its prevalence is about even between poor and well-to-do; in children over school age it seems to affect the better class more frequently, possibly, as is suggested, because the poor are by this time immune to the disease. The conclusion is drawn that "the facts as set out do not in any way conflict with acceptance of a flea hypothesis of spread of scarlet fever, provided it is borne in mind that there is undoubted evidence to show that in the poorer areas the disease tends to attack children at a younger age than in the well-to-do areas, and thus renders the poorer children at the higher ages immune from attack."

INDUSTRIAL MEDICINE.

American Advances in a New Science.

The Medical Correspondent of the *Times* writes:—

There is a movement on foot to urge the General Medical Council to authorize the granting of a Diploma for Industrial Medicine. A similar demand was made on a former occasion, but was refused on the ground that the subject was not then sufficiently developed. The experience of the last few years, however, have materially changed the situation.

The movement comes not a day too soon. On every hand interest in industrial medicine is being quickened. Employers of labour who are alive to the new necessities of their world have followed the experiments conducted by the Ministry of Munitions on questions of fatigue, over-time, early hours and so on with close attention. They have evinced a desire to obtain further information and in some cases have tried to secure the services of specially trained doctors. Unhapply there are not yet many medical men who have studied the subject closely, and so it would seem as if the demand in this instance exceeds the supply.

Meanwhile, the Americans have begun to devote very close attention to the subject. Messrs. Macmillan have just published the first number of a new journal, The Journal of Industrial Hygiene, under the joint editorship of Dr. David L. Edsall, U. S. A., and Dr. Stanley Kent, Great Britain, whose work on "Industrial Fatigue" is so well known. The journal has grown out of the recent establishment of teaching and research in industrial hygiene in the Harvard Medical School. The publishers propose to cover a wide field and to afford abstracts of the evergrowing literature on the subject.

In the present issue there is a very interesting article entitled "Telephone Operating, a Study of its Medical Aspects" by Dr. Anna Richardson, physician of the New England Telephone and Telegraph Company. This article shows with how great care telephone operators are selected by the company, and how well the care is repaid in efficient service; for example:—

"Very careful studies have been made by skilled engineers, watching conditions in an exchange, and listening in on positions, to note every possible variation in an individual's work in order to determine what proportion of time an operator can work well, *i. e.*, render the best service to the public with the fewest possible errors and with the least possible physical and nervous strain. In this way standards have been established which are teachnically called 'loads.' These vary for different types of operators."

There can be little doubt that the steps referred to above to secure efficient teaching of industrial hygiene in this country will be successful, and that at no distant period doctors so trained will have become the friends and advisers both of employers and of employed. Experiments already carried out have proved that between master and men, so far as health and hours of work are concerned, there is, within reasonable limits, one difference of interest; what is good for the one is good also for the other. This is a very important fact, and should have its bearing on the problem of industrial unrest.

BOOKS IN BRIEF.

Indian Constitutional Reform. *By V. A. Smith, C. I. E., M. A., Hon. Lit. D., I. C. S. (Rtd.) Published by the Oxford University Press. Price 3s. 6d. net.*

The danger of historians turning politicians is too well known to need special mention. The late Mr. Lecky did not prove much of a success in the House of Commons—he lost much by his connection with it, honorable though it was to that far famed body. Mr. Smith's essay into politics is neither a happy nor propitious one. He is frankly against the fundamental idea on which the new Reform Bill relating to India is based. We do not say this in a complaining mood; for every man has a right to his views. But when a man like Mr. Smith wants to expound his as a historian of India—his love for India stands unquestioned and he makes a point of it in the preface to his book—we expect him to be at least reasonable in the matter of interpretation. We should not be considered to be too critical. We shall give only one example. Mr. Smith—who has interpreted many an inscription or other historical document—wants us to interpret the word "responsible" in the famous declaration of August 20, 1917, "in the sense of being sensitive to Indian public opinion." We will not stop to comment on this interpretation, for comment on it is needless. Mr. Smith lacks imagination, and whatever his merits as a historian may be, he certainly is neither a statesman nor even a careful interpreter of documents. A scholar interprets a document not so as to read his own particular meaning into it but to bring out the meaning intended by the writer of the record. Mr. Smith says Sivaji was an autocrat and pleads that "the conditions are such that the Government of India must retain extensive 'autocratic' powers." Mr. Smith, like many an other critic, does not care to remember that much water has flown under the Ganges Bridge since the days of Sivaji. European critics will do well to remember that the Indians have not been left to evolve their own political ideas. The effect of the British connection should be given due weight. If this were done, much that is inexplicable in the present day demand of Indians would disappear. Mr. Smith himself, if he did that, would be more reasonable and less hesitant in meeting Indian demands. He would also understand why "educated Indian" has "very different ideas of Government." Mr. Smith's little book is a sad example of history not benefiting historians. We wish he had not yielded to the temptation of entering the stormy field of politics so unfitted to a scholar of his type.

Rudiments of HandCraft. *By W. A. S. Benson, M. A. Published by John Murray, London. 1 s. net.*

This is a justly eloquent plea for handcraft in education. Mr. Benson quotes Professor Findlay's saying.—"The ideal primary teacher is one who, above all, is an artist and a craftsman." He refers also to Ruskin's more famous utterance in which he put forward the ideal of "liberal education founded upon right handcraft." If we are to approach this ideal, "we must lay that foundation in a course," as Mr. Benson puts it "of exercises contrived not only to develop sureness of eye and the touch of skilful hands, but also to stimulate intelligence by making clear the relation which drawings and written words, together with the principles of number and other rudiments of science, bear to the actions set for performance." Mr. Benson, after suggesting that the only material for the main course of such primary exercises is inevitably wood, adds :—

"Just as there is an art of arithmetic which is taught by itself independently of all the special forms of business, domestic or commercial, to which it may afterwards be applicable ; so also, if we are to approach the ideal put forward by Ruskin of a "liberal education founded upon right handicraft," we must lay that foundation in a course of exercises contrived not only to develop sureness of eye and the touch of skilful hands, but also to stimulate intelligence by making clear the relation which drawings and written words, together with the priciples of number and other rudiments of science, bear to the actions set for performance.

Now it happens that the only material we can use for the main course of such primary exercises is inevitably wood ; but this does not, as people too readily assume, imply teaching carpentry or any one other of a score of trades which work in wood. What we have in view is one strand in the general scheme of education, to be woven in with the rest, usually between age limits of eight and twelve and considerably before the average time for specialised or technical training. And though perforce we handle in some shape the same stuff, our methods will be those of children, not of craftsmen; nor shall we follow the distinctive procedure of the joiner, the wheelwright, the cooper, or of any of the rest. For what we aim at is the intelligent control of certain mascular movements, which are the basis of practically all skilled craftsmenship, and at the same time are advantageous in the private life of all and sundry.

Deftly to handle saw and hammer and file and to appreciate the significance of line and rule and compass, taken with the reflex action upon the understanding, surely rank high among the heirlooms of civilisation ; and hereby lies a gateway to science and to art whether for profit of livelihood or enjoyment of life.

Although the decision to use wood as the prime material is easily arrived at, the precise form in which to obtain it is less obvious. For it must be such as can be procured easily and cheaply, and such as not to overtax the strength of young pupils. The nicely planted hardwoods sold to amateurs for fret-sawing are too costly, while to saw up a rough log or to plane a wide plank is too heavy a task for children. But all conditions are satisfied by the common sawn plasterers' lath, which can be worked with but a small collection of cheap tools upon simple substitutes for joiners' benches. Provision should also be made for cutting a few simple shapes from sheet tin, a material widely obtainable as a waste product ; and it is for many reasons desirable to add painting, staining and polishing to our schooling. For these things like cookery, open a door to the chemical side of physics, just as construction does to mechanical science. Further, every exercise should result in a complete useful thing, made on intelligible purpose ; or else be a piece of apparatus to illustrate mechanical theory as the lever, the inclined plane, the wheel and axel or the pendulam. How far the scientific trend is followed must depend upon the individuality of Teacher and Taught : at this early stage it matters little whether the artistic or the scientific aspect be emphasised for in such simple things rightness of adaptation of means to end is obvious from either point of view.

From the first pupils should be taught to work from drawings prepared or at all events traced in school. Instructions should as far as possible be given in writing because it is an invaluable discipline to follow this check upon slip-shod reading and a test of understanding. Thus may a bridge be built between theory, that is, between book work and tangible visible fact."

The booklet is a most suggestive and a thoroughly practical one and we would like it to be placed in the hands of every teacher in this country. In Japan children are made to learn by the eye and the hand more than by the memory. Doing to things certain things rather than loading the memory ought to be the rule in primary education and for that better teachers are required. Until we get them, our primary schools will never be a success.

Owing to "Advertise!" is the title of a book first issued by E. Sampson, $7\frac{1}{2} \times 5\frac{1}{4}$, vii+247 pp. Harrap. 5s. n. containing, as the *Times* says, the principles and practice of advertisement composition according to the latest and most approved American masters of the art. There are, it seems, Ten Commandments of advertising,

ns.—Be human, Be interesting, Be easy to understand, Be easy to read, Be humorous when you can, Be unusual, Be unexpected, Be tempting, Be subtle and Be positive. The author, on the whole, observes every one of them. *Advertising*, he says, "is a chain of ideas, carefully linked together, forcefully expressed, and scientifically calculated to produce a cumulative reaction upon a definite group of people"—an excellent definition were it not that it applies to quite a lot of things besides advertising. Rather better is the ingenious apologia for advertising :—"If you are feeling depressed, pick up a magazine or a newspaper and read the advertising. It will tell you how to cure everything from a backache to a heartache....It is a relief to turn from columns of war, murder, suicide and scandal to this good, healthy, resourceful advertising reading."

We would draw the attention of our readers to a pamphlet **"Notes on Forest Policy and Forest Management"** by Mr. F. A. Lodge, C.I.E., Inspector-General of Forests, Hyderabad. The book is published by the Bulletin Press, Secunderabad. Price 1 Rupee. It gives a Forest Officer's view on Forest Policy in very clear and simple language. Though Mr. Lodge is Inspector-General of Forests in Hyderabad, most of his experience was gained in Madras and the greater part of the pamphlet deals with questions which are of interest to the public in that Presidency.

Water Power in India. Preliminary report on the Water Power Resources in India, drawn up Mr. J. W. Meares, M. I. C. E., Chief Engineer, Hydro-Electric Survey, has now been published by the Superintendent of Government Printing, Calcutta. It consists of seven chapters, illustrated with excellent plates and maps, and fourteen appendixes containing the information hitherto collected regarding the rivers and other possible sources of electric power in India and Burma.

The opening chapter contains a very clear exposition of the methods by which power can be developed from streams and reservoirs, and corrects the popular misconception that a natural waterfall, like that in the Cauvery or at Niagara, is necessary. The importance to India of combined schemes of irrigation and power is also clearly brought out. Further, on "Weather and Water," "Localities and Surveys," "Power and its Uses" are dealt with. Then follows a chapter on State control, Charges for water-power and Leases and agreements. Chapter 6 summarizes our present knowledge of the water-power already developed, under development and examined with a view to development. A general description is given of the conditions in each province as an introduction to the "Lists of sites" in the appendixes. The final chapter puts forward a constructive programme for the further work of the survey in its various aspects, and calls attention to specially favourable sites for survey and perhaps development.

So far as the preliminary investigation has gone—and it is admittedly incomplete—India's industries now absorb a matter of over a million horse power of which only some 285,000, is supplied by electricity from steam, oil or water. The water-power, so far actually in sight, amounts to 1¾ million horse power but this excludes practically all the great rivers at present uninvestigated. Thus, it is stated that the minimum flow of the seven great rivers eastward from the Indus are capable of giving no less than three million horse power for every thousand feet of their fall from the Himalayas, while similar considerations apply to rivers in other parts. Some doubt, however, is expressed as to the estimate of seven million horse power in the Irrawaddy and Chindwin rivers, given in the report of the Conjoint Board of Scientific Societies.

Although this report shows that the Cauvery scheme was the second, and not the first, in India, it was nevertheless the first to show the industrial possibilities of natural power with that which was then a very long transmission line, one of the longest in the world. The further possibilities on the Cauvery, at a Periyar Lake and in the Nilgiri Hills are emphasised. The latter district will, it is believed, very soon have a project in being. The first edition of 2,000 copies has been practically taken up for official use, and a second impression has already been ordered.